

**EPA Superfund**  
**Record of Decision:**

**REICH FARMS**  
**EPA ID: NJD980529713**  
**OU 01**  
**PLEASANT PLAINS, NJ**  
**09/30/1988**

FINAL DRAFT SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT, REICH FARM, PREPARED BY EBASCO SERVICES, AUGUST 1988;

FINAL DRAFT FEASIBILITY STUDY REPORT, REICH FARM, PREPARED BY EBASCO SERVICES, AUGUST 1988;

PROPOSED REMEDIAL ACTION PLAN, REICH FARM, AUGUST 1988;

THE ATTACHED DECISION SUMMARY FOR THE REICH FARM SITE;

THE ATTACHED RESPONSIVENESS SUMMARY FOR THE SITE, WHICH INCORPORATES PUBLIC COMMENTS RECEIVED; AND

STAFF SUMMARIES AND RECOMMENDATIONS.

#### **#DE**

#### **DECLARATIONS**

CONSISTENT WITH THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980, AS AMENDED, AND THE NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN, 40 CFR PART 300, I HAVE DETERMINED THAT THE SELECTED REMEDY IS PROTECTIVE OF HUMAN, HEALTH AND THE ENVIRONMENT, ATTAINS FEDERAL AND STATE REQUIREMENTS THAT ARE APPLICABLE OR RELEVANT AND APPROPRIATE FOR THIS REMEDIAL ACTION, AND IS COST-EFFECTIVE. FURTHERMORE, THIS REMEDY SATISFIES THE PREFERENCE FOR TREATMENT THAT REDUCES THE TOXICITY, MOBILITY OR VOLUME AS A PRINCIPLE ELEMENT AND UTILIZES PERMANENT SOLUTIONS AND ALTERNATE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

BECAUSE THIS REMEDY WILL NOT RESULT IN HAZARDOUS SUBSTANCES REMAINING ON-SITE ABOVE HEALTH PROTECTIVE LEVELS, THE FIVE-YEAR REVIEW REQUIREMENT WILL NOT APPLY TO THIS ACTION.

DATE  
09/30/88

WILLIAM J. MUSOYNSKI, P.E.  
ACTING REGIONAL ADMINISTRATOR

## DECISION SUMMARY

REICH FARM SITE  
DOVER TOWNSHIP, NEW JERSEY

### #SD

#### SITE DESCRIPTION

THE REICH FARM SITE IS AN OPEN, RELATIVELY FLAT SANDY AREA COVERING APPROXIMATELY THREE ACRES IN THE PLEASANT PLAINS SECTION OF DOVER TOWNSHIP, OCEAN COUNTY, NEW JERSEY (FIGURE 1). THE SITE IS SURROUNDED BY COMMERCIAL ESTABLISHMENTS TO THE WEST AND WOODED AREAS IN ALL OTHER DIRECTIONS. TWO BUILDINGS, LOCATED ADJACENT TO THE WEST SIDE OF THE SITE, ARE OCCUPIED BY SEVERAL SMALL BUSINESSES. THE ILLEGAL DRUM DUMPING ACTIVITIES, WHICH RESULTED IN CONTAMINATION OF THE SITE BY HAZARDOUS SUBSTANCES, OCCURRED ON THE PORTION OF THE SITE THAT IS SHOWN IN FIGURE 2.

WITHIN A HALF MILE TO THE EAST AND SOUTH OF THE SITE, LAND USE IS APPROXIMATELY SIXTY PERCENT WOODED AND FORTY PERCENT COMMERCIAL. TO THE NORTH, WEST AND SOUTHWEST, RESIDENTIAL DEVELOPMENT COVERS HALF OF THE AREA; WOODED AREAS AND COMMERCIAL OPERATIONS COMPRISE THE REMAINING LAND USE. THE SITE IS LOCATED APPROXIMATELY ONE MILE NORTHEAST OF THE TOMS RIVER.

THE KIRKWOOD-COHANSEY AQUIFER SYSTEM UNDERLIES THE REICH FARM SITE. THE UPPER PORTION OF THE SYSTEM IS GENERALLY REFERRED TO AS THE COHANSEY AQUIFER AND THE LOWER PORTION AS THE KIRKWOOD AQUIFER. THE AVERAGE DEPTH TO GROUND WATER BENEATH THE SITE IS APPROXIMATELY THIRTY FEET. THE DIRECTION OF GROUND WATER FLOW IN THIS AQUIFER SYSTEM IS GENERALLY TO THE SOUTH-SOUTHWEST.

THE PRINCIPLE SOURCE OF WATER FOR DOVER TOWNSHIP IS THE COHANSEY AQUIFER. AS A RESULT OF A 1974 DOVER TOWNSHIP HEALTH DEPARTMENT ZONING ORDINANCE, THERE ARE NO PRIVATE WELLS WITHIN APPROXIMATELY 4500 FEET OF THE REICH FARM SITE WHICH TAP INTO THIS AQUIFER. THE AREA ENCOMPASSED BY THIS ORDINANCE IS REPRESENTED AS ZONES I AND II IN FIGURE 3. THE TOMS RIVER WATER COMPANY'S (TRWC) PARKWAY WELLFIELD IS LOCATED APPROXIMATELY ONE MILE DOWNGRADIANT OF THE SITE. TRWC IS A MUNICIPAL WATER SUPPLIER IN DOVER TOWNSHIP. IN JUNE 1988, THE WELLFIELD PUMPED AN AVERAGE OF 3.5 MILLION GALLONS OF GROUND WATER PER DAY. FIGURE 4 SHOWS THE LOCATION OF THE PARKWAY WELLFIELD IN RELATION TO THE SITE. ALSO SHOWN IN FIGURE 4 IS TRWC'S PUMPING WELL NUMBER 20, WHICH IS LOCATED OVER A MILE SOUTHWEST OF THE SITE.

### #SH

#### SITE HISTORY

##### ORIGIN OF PROBLEM

THE REICH FARM SITE IS CURRENTLY OWNED BY MR. AND MRS. SAMUEL REICH. THE LEGAL DESCRIPTION OF THE PROPERTY IS BLOCK 410, LOT 22, ON THE DOVER TOWNSHIP TAX MAP. ACCORDING TO THE REICHS, IN AUGUST OF 1971, THEY RENTED A PORTION OF THEIR LAND TO MR. NICHOLAS FERNICOLA FOR TEMPORARY STORAGE OF USED 55-GALLON DRUMS. THAT DECEMBER, THE REICHS DISCOVERED APPROXIMATELY 4,500 DRUMS CONTAINING WASTES AND 450 EMPTY DRUMS ON THE PORTION OF THEIR LAND THAT WAS RENTED TO MR. FERNICOLA. THE LABELS ON THE DRUMS INCLUDED "TAR PITCH", "LAB WASTE SOLVENT", "BLEND OF RESIN AND OIL", AND "SOLVENT WASH OF PROCESS STREAM". MOST OF THE DRUMS HAD UNION CARBIDE CORPORATION (UCC) MARKINGS ON THEM. TRENCHES INTO WHICH WASTES MAY HAVE BEEN DUMPED WERE ALSO FOUND. THESE DISPOSAL ACTIVITIES RESULTED IN CONTAMINATION OF THE SOILS ON-SITE AND ULTIMATELY OF THE GROUND WATER.

##### INITIAL ENFORCEMENT ACTIONS AND SUBSEQUENT REMEDIAL MEASURES

MR. AND MRS. REICH, AS WELL AS THE TOWNSHIP OF DOVER, FILED COMPLAINTS IN NEW JERSEY SUPERIOR COURT AGAINST MR. FERNICOLA AND THE UNION CARBIDE CORPORATION WHICH RESULTED IN THE COURT ORDERING DUMPING TO CEASE AND THE REMOVAL OF ALL WASTE AND DRUMS. ACCORDING TO A TRW REPORT ENTITLED "ANALYSIS OF A LAND DISPOSAL DAMAGE INCIDENT INVOLVING HAZARDOUS WASTE MATERIALS DOVER TOWNSHIP, NEW JERSEY", AND DATED MAY 1976, DRUM REMOVAL WAS UNDERTAKEN BY UNION CARBIDE AND COMPLETED IN MARCH 1972. IN JUNE 1974, ANOTHER 51 DRUMS AND APPROXIMATELY 1100 CUBIC YARDS OF CONTAMINATED SOIL AND TRENCHED WASTES WERE REMOVED FROM THE SITE. THE SOIL WAS EXCAVATED ON THE BASIS OF VISUAL INSPECTION AND ODOR.

EARLY IN 1974, SOME RESIDENTS NEAR THE SITE OBSERVED AN UNUSUAL TASTE AND ODOR IN THEIR WELL WATER. ANALYSES PERFORMED ON THIS WATER SHOWED THE PRESENCE OF PETROCHEMICAL CONTAMINANTS, INCLUDING PHENOL AND TOLUENE. A MORE EXTENSIVE SAMPLING PROGRAM WAS THEN UNDERTAKEN. BASED ON THE RESULTS OF THIS SAMPLING, THE DOVER TOWNSHIP BOARD OF HEALTH (DTBH) ORDERED 148 PRIVATE WELLS CLOSED BY THE END OF AUGUST 1974, AND ESTABLISHED A ZONING ORDINANCE RESTRICTING GROUND WATER USE IN THE AREA OF REICH FARM.

THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP) FILED SUIT AGAINST UCC CHARGING THE COMPANY WITH POLLUTING THE PUBLIC WATER SUPPLY IN THE PLEASANT PLAINS SECTION OF DOVER TOWNSHIP BY IMPROPERLY DISPOSING OF LIQUID CHEMICAL WASTES. THE SUIT ALSO NAMED NICHOLAS FERNICOLA AS A DEFENDANT. ON APRIL 21, 1977, UCC SIGNED A CONSENT ORDER WITH NJDEP FOR THE STATE TO PERFORM ADDITIONAL INVESTIGATIONS AT THE SITE. IN JUNE 1977, NJDEP DROPPED CHARGES AGAINST NICHOLAS FERNICOLA IN RETURN FOR MR. FERNICOLA'S AGREEMENT TO CEASE HAULING AND DISPOSING OF CHEMICAL WASTES.

REICH FARM WAS ONE OF 418 SITES PLACED ON THE EPA PROPOSED NATIONAL PRIORITIES LIST (NPL) PUBLISHED IN DECEMBER 1982. THE FINAL APPROVAL FOR INCLUSION ON THE NPL WAS GIVEN IN SEPTEMBER 1983.

#### REMEDIAL ACTIONS BY EPA

EPA PERFORMS REMEDIAL ACTIONS AT TOXIC WASTE SITES IN ACCORDANCE WITH THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA) OF 1980, WHICH WAS AMENDED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) OF 1986. IN MOST INSTANCES, THESE ACTIONS ARE UNDERTAKEN IN THREE MAJOR PHASES. FIRST, A REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (RI/FS) IS CONDUCTED TO DETERMINE THE NATURE AND EXTENT OF THE CONTAMINATION PRESENT AT THE SITE, AND TO DEVELOP AND EVALUATE A RANGE OF REMEDIAL ACTION ALTERNATIVES TO DEAL WITH THAT CONTAMINATION. AFTER THE RI/FS IS COMPLETED, A RECORD OF DECISION (ROD) IS PREPARED TO DOCUMENT THE REMEDY SELECTED. SUBSEQUENTLY, THE REMEDIAL DESIGN (RD) PHASE BEGINS, FOLLOWED BY THE REMEDIAL ACTION (RA), DURING WHICH THE DESIGN IS IMPLEMENTED.

IN ADDITION TO THESE SCHEDULED ACTIVITIES, A REMOVAL ACTION MAY BE TAKEN AT ANY TIME TO ADDRESS ACUTE HAZARDS POSED BY A SITE.

#### REMEDIAL INVESTIGATION

IN ACCORDANCE WITH THE NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN (NCP), EPA CONDUCTED A RI/FS AT THE REICH FARM SITE. SAMPLING OF GROUND WATER AND SURFACE AND SUBSURFACE SOILS AT THE SITE; IN ADDITION TO POTABLE WELL SAMPLING OFF-SITE, WAS PERFORMED IN MAY AND JUNE OF 1986 AS PART OF A PRELIMINARY REMEDIAL INVESTIGATION. THE FORMAL FIELD WORK FOR THE SUPPLEMENTAL REMEDIAL INVESTIGATION, WHICH WAS UNDERTAKEN TO PROVIDE ADDITIONAL DATA ON SITE CONDITIONS, BEGAN IN JULY 1987 AND WAS COMPLETED IN APRIL 1988. MAJOR CONTAMINANTS IN THE SOILS AND GROUND WATER ARE LISTED IN TABLE 1, WHICH INCLUDES DATA FROM EACH ROUND OF SAMPLING CONDUCTED AS PART OF A REMEDIAL INVESTIGATION.

DURING THE PRELIMINARY RI, THE SHALLOW SOILS ON-SITE WERE INVESTIGATED BY THE COLLECTION AND ANALYSIS OF 80 SOIL SAMPLES FROM 25 BOREHOLES. COMMON SAMPLING DEPTHS WERE 5, 10 AND 15 FEET. THE SUPPLEMENTAL RI SOIL SAMPLING PROGRAM, CONDUCTED IN 1987, INCLUDED 27 SOIL BORINGS AND 8 WELL BORINGS. ANALYTICAL SAMPLES WERE GENERALLY TAKEN FROM 15-35 FEET BELOW GROUND TO SUPPLEMENT THE PREVIOUS SAMPLING. ALTHOUGH THERE WERE SOME VOLATILE AND SEMI-VOLATILE ORGANICS DETECTED IN THE SOILS ABOVE A 10 FOOT DEPTH, THEIR CONCENTRATIONS DID NOT EXCEED THE EXISTING CLEANUP LEVELS ESTABLISHED BY NJDEP OF 1 PART PER MILLION (PPM) OF TOTAL VOLATILE ORGANICS AND 10 PPM OF TOTAL SEMI-VOLATILE ORGANICS. THESE LEVELS ARE KNOWN AS THE NEW JERSEY SOIL ACTION LEVELS AND ARE SHOWN FOR COMPARISON IN TABLE 1 (PARTS A AND B). THE CONCENTRATIONS OF TOTAL VOLATILE ORGANICS AND TOTAL SEMI-VOLATILE ORGANICS IN CERTAIN AREAS (REFERRED TO AS "HOT SPOTS") OF THE SOIL BELOW A 10 FOOT DEPTH DID EXCEED THEIR RESPECTIVE CRITERIA. THE LEVEL OF NICKEL IN ONE SOIL SAMPLE EXCEEDED THE ACTION LEVEL OF 100 PPM. NO OTHER INORGANICS WERE DETECTED IN THE SOIL AT CONCENTRATIONS ABOVE THEIR CRITERION.

TEN MONITORING WELLS WERE INSTALLED ON-SITE AND SAMPLED AS PART OF THE PRELIMINARY RI. THESE WELLS WERE SCREENED FROM 25 TO 125 FEET BELOW THE SURFACE. TWELVE ADDITIONAL ON-SITE MONITORING WELLS WERE INSTALLED, AND ALL MONITORING WELLS WERE SAMPLED, DURING THE SUPPLEMENTAL RI. NINE RESIDENTIAL WELLS IN THE AREA AND TEN TOMS RIVER WATER COMPANY WELLS WERE SAMPLED IN 1986 AS PART OF THE PRELIMINARY RI. ONE OF THE

RESIDENTIAL WELLS AND THREE OF THE MUNICIPAL WELLS WERE RESAMPLED DURING THE SUPPLEMENTAL RI IN 1987. THE ANALYTICAL RESULTS FOR ALL OF THESE GROUND WATER SAMPLING EVENTS ARE SHOWN IN TABLE 1 (PARTS C AND D) ALONG WITH THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) ESTABLISHED BY EPA OR NJDEP.

THE STATE ARARS FOR THE VARIOUS INORGANIC CHEMICALS LISTED IN TABLE 1 (PARTS C AND D) ARE KNOWN AS THE STATE OF NEW JERSEY MAXIMUM CONTAMINANT LEVELS (MCLS) FOR "A-280" CONTAMINANTS. NICKEL, LEAD AND CADMIUM WERE THE ONLY INORGANICS WHICH EXCEEDED THESE LEVELS IN THE GROUND WATER SAMPLING.

DURING THE PRELIMINARY RI, THE TEN MONITORING WELLS IN PLACE AT THAT TIME WERE TESTED FOR METALS. NICKEL WAS DETECTED IN ONLY ONE OF THESE WELLS. THE LEVEL DETECTED IN THIS MONITORING WELL, WHICH WAS LOCATED UPGRADIENT OF THE SITE, WAS ABOVE THE NEW JERSEY MCL FOR NICKEL (13.4 PARTS PER BILLION (PPB)). FIVE OF THE ORIGINAL TEN MONITORING WELLS, INCLUDING ONE UPGRADIENT WELL, WERE RESAMPLED FOR METALS IN NOVEMBER 1987 AS PART OF THE SUPPLEMENTAL RI. NICKEL WAS DETECTED AT CONCENTRATIONS EXCEEDING THE NEW JERSEY MCL IN ALL FIVE OF THESE WELLS. TWO OFF-SITE WELLS WHICH WERE SAMPLED FOR METALS IN 1986 ALSO SHOWED NICKEL ABOVE THE NEW JERSEY MCL.

LEAD WAS DETECTED AT A LEVEL OF 56 PPB IN-TRWC'S DUGAN LANE MONITORING WELL AND AT 58 PPB IN TRWC'S WELL NUMBER 20. THESE SAMPLES WERE TAKEN IN MAY 1986 AS PART OF THE PRELIMINARY RI. THE STATE AND FEDERAL CLEANUP LEVELS ARE BOTH CURRENTLY SET AT 50 PPB FOR LEAD. LEAD WAS NOT DETECTED ABOVE THIS LEVEL IN ANY MONITORING WELLS ON-SITE, OR IN ANY OTHER OFF-SITE WELLS SAMPLED.

CADMIUM WAS DETECTED ABOVE ITS NEW JERSEY MCL IN ONE UPGRADIENT MONITORING WELL, AND IN TRWC'S DUGAN LANE MONITORING WELL, DURING SAMPLING IN 1986. CADMIUM WAS ALSO DETECTED ABOVE THE EPA DRINKING WATER ONE DAY HEALTH ADVISORY IN A RESIDENTIAL WELL SAMPLED IN JUNE 1986. THIS WELL WAS NOT USED FOR DRINKING WATER AT THE TIME AND IS NOW OUT OF USE. CADMIUM WAS NOT DETECTED IN ANY OF THE OTHER 1986 SAMPLES, NOR WAS IT DETECTED IN 1987. FIVE OF THE MONITORING WELLS SAMPLED IN 1987 SHOWED CONCENTRATIONS OF CHROMIUM ABOVE THE NEW JERSEY POLLUTION DISCHARGE ELIMINATION SYSTEM (NJPDDES) CRITERIA OF 50 PPB. ONE OF THESE WELLS WAS LOCATED UPGRADIENT OF THE SITE. THIS WAS THE ONLY WELL IN WHICH CHROMIUM WAS DETECTED DURING THE 1986 SAMPLING.

THE LABELS ON THE DRUMS FOUND ON THE SITE, AND THE WASTE DESCRIPTIONS PROVIDED BY UCC, DID NOT INDICATE THAT METALS WERE DISPOSED AT REICH FARM. ALSO, THE RANDOMNESS OF THE NICKEL, LEAD, CADMIUM AND CHROMIUM DETECTIONS, AND THE FACT THAT NICKEL, CADMIUM AND CHROMIUM WERE DETECTED IN UPGRADIENT WELLS AND LEAD WAS NOT DETECTED IN ANY ON-SITE WELLS, SEEM TO INDICATE THAT REICH FARM IS NOT THE SOURCE OF THESE METALS IN THE GROUND WATER.

IRON AND MANGANESE WERE DETECTED ABOVE THEIR RESPECTIVE FEDERAL SAFE DRINKING WATER ACT SECONDARY STANDARDS IN A NUMBER OF GROUND WATER SAMPLES. THESE STANDARDS RELATE TO THE AESTHETIC QUALITY OF DRINKING WATER (I.E., ODOR AND TASTE) AND DO NOT INDICATE A POTENTIAL HEALTH RISK.

THE COMPOUNDS, 1,2-DICHLOROETHANE AND CARBON TETRACHLORIDE, WERE DETECTED AT CONCENTRATIONS SLIGHTLY ABOVE THEIR RESPECTIVE NEW JERSEY MCLS IN ONLY A SMALL NUMBER OF SAMPLES. 1,2-DICHLOROETHANE WAS DETECTED IN ONE OUT OF 45 MONITORING WELL SAMPLES AND WAS NOT DETECTED IN ANY OFF-SITE WELLS; CARBON TETRACHLORIDE WAS DETECTED IN ONE MONITORING WELL SAMPLE AND ONE RESIDENTIAL WELL SAMPLE. THIS RESIDENTIAL WELL DID NOT SHOW ANY CARBON TETRACHLORIDE WHEN IT WAS RESAMPLED BY THE OCEAN COUNTY BOARD OF HEALTH IN 1988. THE PRESENCE OF THESE COMPOUNDS IN THE GROUND WATER IS NOT CONSIDERED SIGNIFICANT BECAUSE OF THE LIMITED NUMBER OF DETECTIONS AND THE LOW CONCENTRATIONS WHICH WERE MEASURED.

METHYLENE CHLORIDE (MC) WAS DETECTED IN FOUR OUT OF 30 MONITORING WELL SAMPLES. ALL OF THESE DETECTIONS WERE AT CONCENTRATIONS ABOVE THE NEW JERSEY MCL FOR THIS COMPOUND. DUE TO THE SMALL NUMBER OF DETECTIONS, AND THE FACT THAT MC IS A TYPICAL FIELD AND LABORATORY CONTAMINANT, THE MC FOUND IN THE GROUND WATER WAS NOT THOUGHT TO BE SITE RELATED. ADDITIONAL SAMPLING WILL BE NECESSARY TO DETERMINE THE TRUE SOURCE OF THIS COMPOUND. AFTER THE RESULTS OF THIS SAMPLING ARE KNOWN, ANY GROUND WATER TREATMENT TO BE UNDERTAKEN AT THE SITE CAN BE ADJUSTED, IF NECESSARY.

THE VOLATILE ORGANIC COMPOUNDS, 1,1,1-TRICHLOROETHANE (TCA), TRICHLOROETHENE (TCE) AND TETRACHLOROETHENE (PCE), EXCEEDED THEIR RESPECTIVE NEW JERSEY MCLS IN A NUMBER OF WELLS SAMPLED IN 1986 AND 1987. THESE WELLS WERE ALL SCREENED FROM 30-55 FEET BELOW THE SURFACE IN THE UPPER PORTION OF THE KIRKWOOD-COHANSEY AQUIFER

SYSTEM. TWO OF TRWC'S WELLS WHICH ARE SCREENED IN THIS PORTION OF THE AQUIFER SYSTEM SHOWED LEVELS OF TCE SLIGHTLY ABOVE THE NEW JERSEY MCL WHEN SAMPLED IN MAY AND JUNE OF 1986. ONE OF THESE WELLS WAS RESAMPLED IN NOVEMBER 1987 AND SHOWED THE SAME LEVEL OF TCE AS IN THE PREVIOUS SAMPLE. TRWC'S DUGAN LANE MONITORING WELL, WHICH LIES BETWEEN THE REICH FARM SITE AND THE PARKWAY WELLFIELD, DID NOT SHOW ANY TCE CONTAMINATION WHEN SAMPLED IN 1986 OR 1987.

#### CONTAMINANT PATHWAYS AND ASSOCIATED HEALTH RISKS

A PUBLIC HEALTH EVALUATION (PHE) WAS PERFORMED AT THE REICH FARM SITE TO DETERMINE THE IMPACT OF THE SITE ON PUBLIC HEALTH AND THE ENVIRONMENT UNDER VARIOUS EXPOSURE SCENARIOS AND DIFFERENT CONTAMINANT PATHWAYS. THIS EVALUATION IS PRESENTED IN SECTION 6 OF THE SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT. THE PHE IDENTIFIED 13 INDICATOR CHEMICALS IN ACCORDANCE WITH THE SUPERFUND PUBLIC HEALTH EVALUATION MANUAL AND DOCUMENTED THE EXISTENCE OF TWO CONTAMINATED MEDIA SOIL AND GROUND WATER. THESE CHEMICALS WERE ALL DETECTED AT LEVELS HIGHER THAN BACKGROUND CONCENTRATIONS. THEY ARE AS FOLLOWS: ACETONE, BIS(2-ETHYLHEXYL)PHTHALATE (BEHP), CHLOROBENZENE, DI-N-BUTYL PHTHALATE, 1,1-DICHLOROETHANE, 1,2-DICHLOROETHENE, ETHYLBENZENE, STYRENE, PCE, TOLUENE, TCA, TCE, AND XYLENE. ALTHOUGH ONLY TWO CONTAMINATED MEDIA WERE IDENTIFIED, THE POTENTIAL EXISTS FOR MIGRATION OF THE CONTAMINANTS INTO OTHER EXPOSURE MEDIA, SUCH AS AIR AND SURFACE WATER, WHICH WERE BOTH INCLUDED IN THE RI.

THE PHE INVOLVES FOUR STEPS. THE FIRST STEP IS TO IDENTIFY INDICATOR CHEMICALS TO ADDRESS THE POTENTIAL PUBLIC HEALTH AND ENVIRONMENTAL CONCERNS ASSOCIATED WITH THE SITE. THE NEXT STEP IS TO USE AVAILABLE DATA ON THE TOXICITY OF EACH CHEMICAL TO DETERMINE WHETHER THE CONTAMINANTS PRESENT AT THE SITE MAY BE ASSOCIATED WITH ADVERSE HEALTH AND/OR ENVIRONMENTAL EFFECTS. THE THIRD STEP IDENTIFIES LIKELY EXPOSURE SCENARIOS AND DEFINES THE INDIVIDUALS WHO MAY BE AT RISK VIA THESE EXPOSURE SCENARIOS, AS WELL AS THE MOST LIKELY INDICATOR COMPOUND CONCENTRATIONS ASSOCIATED WITH THESE SCENARIOS. THE PHE AT REICH FARM USED THE MAXIMUM CONCENTRATION OF EACH INDICATOR CHEMICAL DETECTED IN THE SOIL AND GROUND WATER. THE FINAL STEP IN THE PROCESS IS THE CALCULATION OF POTENTIAL RISKS ASSOCIATED WITH EXPOSURE TO INDICATOR CHEMICALS.

IN THE PHE, INDIVIDUAL CONTAMINANTS WERE SEPARATED INTO TWO CATEGORIES OF CHEMICAL TOXICITY DEPENDING ON WHETHER THEY CAUSE CARCINOGENIC OR NON-CARCINOGENIC EFFECTS. IN THE CASE OF CHEMICALS EXHIBITING CARCINOGENIC EFFECTS, EXPOSURES AND ASSOCIATED RISKS ARE EXPRESSED IN AN EXPONENTIAL NOMENCLATURE;  $1 \times 10^{-4}$  (ONE IN TEN THOUSAND),  $1 \times 10^{-7}$  (ONE IN TEN MILLION), ETC. EPA HAS USED THE RANGE OF  $1 \times 10^{-4}$  TO  $1 \times 10^{-7}$  IN EVALUATING RISK. THE LEVEL OF  $1 \times 10^{-6}$ , ONE IN A MILLION, HAS OFTEN BEEN USED BY REGULATORY AGENCIES AS A BENCHMARK. FOR CHEMICALS EXHIBITING NON-CARCINOGENIC EFFECTS, EXPOSURES AND ASSOCIATED RISKS ARE EXPRESSED AS A RATIO. THIS RATIO, CALLED A HAZARD INDEX, IS ESTIMATED BY DIVIDING THE AMOUNT OF A CHEMICAL THAT AN INDIVIDUAL MIGHT BE EXPOSED TO BY THE AMOUNT OF THE CHEMICAL THAT WILL NOT CAUSE ANY ADVERSE HEALTH EFFECTS. A HAZARD INDEX THAT IS LESS THAN 1.0 INDICATES THAT NO ADVERSE HEALTH IMPACTS WOULD BE EXPECTED.

A SUMMARY OF THE POTENTIAL RISKS POSED BY EACH PATHWAY EVALUATED IN THE PHE IS GIVEN IN TABLE 2.

THE POTENTIAL FOR SIGNIFICANT EXPOSURE THROUGH DERMAL CONTACT WITH AND INCIDENTAL INGESTION OF SITE SOILS BY TRESPASSERS IS CONSIDERED LOW DUE TO THE ACTIVITIES OF THE CONSTRUCTION COMPANY WHICH PRESENTLY OCCUPIES A PORTION OF THE SITE. IN ADDITION, THIS DIRECT PATHWAY REPRESENTS A SMALL POTENTIAL HEALTH HAZARD SINCE THE RI FINDINGS INDICATE THAT THE SURFACE SOILS ARE NOT SIGNIFICANTLY CONTAMINATED BECAUSE OF THE PAST EXCAVATION ACTIVITIES AT THE SITE. AS WAS PREVIOUSLY NOTED, THE LEVELS OF CONTAMINANTS FOUND IN THE SURFACE SOILS DID NOT EXCEED THE EXISTING SOIL ACTION LEVELS ESTABLISHED BY NJDEP. THE PHE SHOWED THAT NONE OF THE INDICATOR COMPOUNDS WOULD POSE A RISK VIA THIS EXPOSURE PATHWAY.

THREE MIGRATION PATHWAYS MAY EXIST FOR THE TRANSPORT OF CONTAMINANTS FROM THE SOILS TO THE AIR: VOLATILIZATION FROM THE SURFACE SOILS, VOLATILIZATION DUE TO ON-SITE TRENCHING ACTIVITIES, AND RESUSPENSION OF THE SOILS THROUGH WIND EROSION OR MECHANICAL DISTURBANCES. ALL OF THESE PATHWAYS WERE EVALUATED IN THE PHE. IT WAS FOUND THAT THEY DO NOT REPRESENT A RISK TO HUMAN HEALTH DUE TO THE LOW LEVELS OF VOLATILE ORGANICS IN THE SURFACE SOILS.

SOIL CONTAMINANTS MAY ALSO MIGRATE INTO SURFACE WATER BY OVERLAND FLOW. SURFACE RUNOFF AT THE REICH FARM SITE IS AN UNLIKELY TRANSPORT ROUTE FOR THREE REASONS. FIRST, THE NEAREST STREAM OR RUNOFF CHANNEL IS

APPROXIMATELY 0.75 MILE FROM THE SITE. SECOND, THE SITE IS FAIRLY LEVEL WITH ONLY A MINIMAL SURFACE GRADIENT. THIRD, THE SOIL IS PREDOMINANTLY SANDY AND IS THUS HIGHLY PERMEABLE FOLLOWING PRECIPITATION. DURING BOTH THE PRELIMINARY AND SUPPLEMENTAL RIS, THERE WAS NO EVIDENCE OF SOILS TRANSPORTED VIA SURFACE RUNOFF IN THE WOODED AREAS ADJACENT TO THE PROPERTY. FOR THESE REASONS, THE RISK FROM EXPOSURE TO CONTAMINATED SURFACE WATERS WAS NOT EVALUATED IN THE PHE.

THE GROUND WATER UNDERLYING THE REICH FARM SITE IS NOT CURRENTLY USED AS A SOURCE OF DRINKING WATER; THEREFORE, AT THIS TIME, IT POSES NO RISK TO HUMAN HEALTH. THE RISK POSED BY THE POTENTIAL FUTURE INGESTION OF THE GROUND WATER ON-SITE WAS EVALUATED IN THE PHE AND WILL BE PRESENTED LATER IN THIS DISCUSSION. IN REGARD TO THE GROUND WATER IN THE VICINITY OF THE SITE WHICH IS USED AS A POTABLE WATER SOURCE, THE ANALYSES PERFORMED ON RESIDENTIAL WELLS IN THE AREA GAVE NO EVIDENCE THAT REICH FARM IS CURRENTLY IMPACTING PRIVATE DRINKING WELLS; IN ADDITION, SAMPLES OF ON-SITE WELLS SCREENED IN THE LOWER PORTION OF THE KIRKWOOD-COHANSEY AQUIFER SYSTEM SHOWED NO SIGNS OF CONTAMINATION. THEREFORE, IT APPEARS THAT NEARBY RESIDENTS USING THIS PORTION OF THE AQUIFER SYSTEM ARE NOT CURRENTLY BEING AFFECTED BY THE REICH FARM SITE.

GROUND WATER SAMPLES FROM THE MUNICIPAL WATER SUPPLY IN THE AREA (TRWC), WHICH WERE COLLECTED DURING THE RIS, INDICATED LOW LEVELS OF TCE, SLIGHTLY ABOVE THE NEW JERSEY MCL OF 1 PART PER BILLION, IN A NUMBER OF THE WELLS IN THE PARKWAY WELLFIELD. TRWC HAS ALSO DETECTED LOW LEVELS OF TCE DURING ITS SAMPLING OF THE PARKWAY WELLFIELD PUMPING WELLS. AN AIR STRIPPER HAS BEEN INSTALLED ON THE WELL SHOWING THE HIGHEST LEVELS OF TCE (14 PPB IS THE HIGHEST LEVEL DETECTED THUS FAR) TO TREAT THE GROUND WATER TO BELOW THE NEW JERSEY MCL. THIS STRIPPER IS CAPABLE OF TREATING COMPOUNDS OTHER THAN TCE AND CAN ALSO HANDLE THE WATER FROM MORE THAN ONE PRODUCTION WELL. CONSEQUENTLY, AT PRESENT, THERE IS NO HEALTH RISK ASSOCIATED WITH DRINKING WATER FROM THE PARKWAY WELLFIELD.

THERE IS NOT ENOUGH EVIDENCE AVAILABLE TO EITHER LINK REICH FARM WITH THE CONTAMINATION AT TRWC'S PARKWAY WELLFIELD, OR TO RULE OUT REICH FARM AS THE SOURCE. PRELIMINARY MODELING EFFORTS CONDUCTED DURING THE SUPPLEMENTAL REMEDIAL INVESTIGATION HAVE INDICATED THAT REICH FARM IS IN THE ZONE OF INFLUENCE OF THE PARKWAY WELLFIELD. THIS MEANS THAT THE GROUND WATER LEAVING REICH FARM WILL LIKELY BE COLLECTED BY THE WELLFIELD AT SOME POINT IN TIME. YET, THERE IS NO DEFINITE PATTERN OF CONTAMINATION WHICH LINKS REICH FARM WITH THE PARKWAY WELLFIELD. FURTHER WORK WILL BE REQUIRED TO DELINEATE THE LEADING EDGE OF THE GROUND WATER CONTAMINANT PLUME ORIGINATING FROM THE REICH FARM SITE. THESE EFFORTS WILL INCLUDE THE SAMPLING OF ANY WELLS BETWEEN REICH FARM AND THE PARKWAY WELLFIELD WHICH WERE NOT SEALED IN 1974, AND, IF NECESSARY, THE INSTALLATION AND SAMPLING OF ADDITIONAL MONITORING WELLS IN THIS AREA.

ANOTHER EXPOSURE SCENARIO WHICH WAS EVALUATED IN THE PHE IS THE POTENTIAL FUTURE INGESTION OF THE GROUND WATER ON-SITE. THE PHE FOUND TCE, PCE, BEHP, AND ACETONE TO BE COMPOUNDS OF CONCERN FOR THIS SCENARIO. BEHP AND ACETONE WERE DETERMINED TO POSE A SIGNIFICANT RISK BECAUSE BOTH WERE FOUND AT EXTREMELY HIGH CONCENTRATIONS IN SEPARATE GROUND WATER SAMPLES. THIS HAD A SIGNIFICANT EFFECT ON THE RISK CALCULATION BECAUSE THE CALCULATION WAS BASED ON THE MAXIMUM CONCENTRATION AT WHICH EACH INDICATOR COMPOUND WAS DETECTED.

THE MAXIMUM ACETONE CONCENTRATION OF 74,000 PPB MUST BE QUESTIONED DUE TO THE INFREQUENCY OF ACETONE DETECTIONS IN THE GROUND WATER SAMPLING (7 DETECTIONS IN 26 SAMPLES) AND THE DIFFERENCE BETWEEN THIS VALUE AND 690 PPB, THE NEXT HIGHEST CONCENTRATION DETECTED. BASED ON THE RESULTS OF THE PHE, INGESTION OF 690 PPB OF ACETONE IN THE GROUND WATER WOULD NOT POSE A SIGNIFICANT HEALTH RISK. AT THE PRESENT TIME, THERE ARE NO ARARS GOVERNING THE PRESENCE OF ACETONE IN GROUND WATER. THE HEALTH PROTECTIVE LEVEL CALCULATED IN THE PHE FOR ACETONE WAS 3.5 PPM.

THE MAXIMUM CONCENTRATION OF BEHP DETECTED IN THE GROUND WATER WAS 2200 PPB, WHICH IS SIGNIFICANTLY HIGHER THAN THE NEXT HIGHEST DETECTION OF 95 PPB AND ITS SOLUBILITY AT 20 DEGREES CENTIGRADE (1300 PPB). SINCE A COMPOUND'S SOLUBILITY REPRESENTS THE HIGHEST CONCENTRATION THAT IT IS LIKELY TO ATTAIN IN THE GROUND WATER, THE MAXIMUM BEHP DETECTION SHOULD BE CONSIDERED AN ANOMALY. THE CLEAN WATER ACT WATER QUALITY CRITERIA FOR HUMAN HEALTH WHICH HAS BEEN ADJUSTED FOR DRINKING WATER, IS 21 PPM FOR BEHP. THIS IS CONSIDERABLY HIGHER THAN THE HEALTH PROTECTIVE LEVEL DETERMINED IN THE PHE (25 PPB). THE LARGE DIFFERENCE IN THESE TWO VALUES IS A RESULT OF NEW INFORMATION ON THE HEALTH RISK POSED BY THE INGESTION OF BEHP. THIS INFORMATION WAS USED IN THE PHE, BUT WAS NOT AVAILABLE AT THE TIME THE WATER QUALITY CRITERIA WAS DEVELOPED.

ACETONE AND BEHP ARE TYPICAL FIELD AND LABORATORY CONTAMINANTS WHICH MAY ACCOUNT FOR THE HIGH CONCENTRATIONS

DETECTED. ADDITIONAL SAMPLING WILL BE REQUIRED TO DETERMINE IF ACETONE AND BEHP ARE TRULY PRESENT IN THE GROUND WATER AT CONCENTRATIONS ABOVE HEALTH PROTECTIVE LEVELS. IF THE SAMPLING INDICATES THAT THIS IS THE CASE, ANY GROUND WATER TREATMENT UNDERTAKEN AT THE SITE WILL NEED TO ADDRESS THE REMOVAL OF THESE COMPOUNDS.

ANOTHER SIGNIFICANT MIGRATION ROUTE AT REICH FARM IS CONTAMINANT TRANSPORT FROM THE SUBSURFACE SOILS TO THE GROUND WATER. THE SANDY SOILS ON-SITE WILL ALLOW EXTENSIVE PERCOLATION OF RAIN WATER AND SURFACE DISCHARGE WATER THROUGH THE CONTAMINATED ZONE. THE MAXIMUM CONCENTRATION THAT A CONTAMINANT, WHICH IS CURRENTLY PRESENT IN THE SOIL, CAN EVENTUALLY ATTAIN IN THE GROUND WATER, WAS CALCULATED IN SECTION 5 OF THE SUPPLEMENTAL RI REPORT FOR THE VOLATILE ORGANICS ETHYLBENZENE, CHLOROBENZENE, TOLUENE, STYRENE AND XYLENE. THESE VALUES WERE THEN USED IN THE PHE TO DETERMINE THE INDIVIDUAL RISKS THAT THESE CONTAMINANTS WOULD POSE VIA THE GROUND WATER EXPOSURE SCENARIOS. IT WAS FOUND THAT ETHYLBENZENE AND CHLOROBENZENE WOULD POSE A SIGNIFICANT HEALTH RISK IF THEY ATTAIN THEIR MAXIMUM CONCENTRATIONS IN THE GROUND WATER AND IF THIS WATER WAS THEN USED FOR DRINKING PURPOSES.

THIS TYPE OF ANALYSIS WAS NOT DONE FOR ANY SEMI-VOLATILE ORGANIC BECAUSE THE SEMI-VOLATILE SHOWING THE HIGHEST LEVELS IN THE SOIL (BEHP) IS ALSO CURRENTLY PRESENT IN THE GROUND WATER. IT WAS DECIDED THAT THE RISK POSED BY THE BEHP IN THE GROUND WATER WOULD BE EVALUATED AND THEN USED TO INDICATE THE POTENTIAL RISK POSED BY THIS COMPOUND AND, IN TURN, THE OTHER SEMI-VOLATILES IN THE SOIL. ALTHOUGH THE HIGHEST LEVEL OF BEHP FOUND IN THE GROUND WATER IS CONSIDERED AN ANOMALY, THE NUMBER OF DETECTIONS (18 DETECTIONS IN 44 SAMPLES) SEEMS TO INDICATE THAT BEHP HAS INDEED REACHED THE GROUND WATER AT SOME LEVEL. IF BEHP CONTINUES TO MIGRATE FROM THE SOIL, IT IS LIKELY THAT IT WILL EVENTUALLY POSE A HEALTH RISK IN THE GROUND WATER BASED ON THE LOW HEALTH PROTECTIVE LEVEL CALCULATED IN THE PHE FOR THE INGESTION OF BEHP IN GROUND WATER (25 PPB).

THE MIGRATION OF CONTAMINANTS FROM THE GROUND WATER INTO THE AIR IS NOT CONSIDERED LIKELY BASED ON THE RI FINDINGS, ALTHOUGH A POSSIBLE INHALATION PATHWAY COULD EXIST IN A SITUATION WHERE CONTAMINATED WATER IS BEING USED IN A HOUSEHOLD SHOWER. THIS USAGE COULD CAUSE SOME ORGANIC CONTAMINANTS TO VOLATILIZE, THUS ALLOWING THEM TO BE INHALED. THIS PATHWAY WAS ASSESSED IN THE PHE AND WAS NOT FOUND TO CAUSE A SIGNIFICANT RISK.

ALTHOUGH NO ENVIRONMENTAL ASSESSMENT WAS PERFORMED FOR THE REICH FARM SITE, IT DOES NOT APPEAR THAT THE SITE POSES A SIGNIFICANT RISK TO THE LOCAL FLORA OR FAUNA. A LARGE PORTION OF THE GROUND WATER CONTAMINATION AT REICH FARM CONSISTED OF LOW-MOLECULAR WEIGHT VOLATILE ORGANIC COMPOUNDS WHICH DO NOT REPRESENT A TOXIC POTENTIAL AND/OR BIOCONCENTRATION POTENTIAL FOR STREAM BIOTA. IN FACT, IF GROUND WATER CONTAMINATED WITH VOLATILES ENTERED THE INTERMITTENT STREAM WHICH IS LOCATED LESS THAN A MILE FROM THE SITE, THE VOLATILES WOULD VOLATILIZE RAPIDLY INTO THE AIR BEFORE IMPACTING THE BIOTA. THE WOODED AREAS SURROUNDING REICH FARM PROVIDE AMPLE COVER AND FOOD FOR TERRESTRIAL FAUNA. THE PHE DID NOT FIND ANY OF THE EXPOSURE PATHWAYS TO THE SOILS ON-SITE TO POSE A SIGNIFICANT RISK. IN ADDITION, ACTIVITIES ASSOCIATED WITH THE COMPANIES ON-SITE ARE PROBABLY SUFFICIENT TO KEEP MOST TERRESTRIAL FAUNA IN THE WOODED AREAS.

#### **#EA**

##### **ENFORCEMENT ACTIVITIES**

THREE POTENTIALLY RESPONSIBLE PARTIES (PRPS) WERE IDENTIFIED FOR THE REICH FARM SITE. ALL OF THE PRPS WERE NOTIFIED IN WRITING ON OCTOBER 3, 1983 AND GIVEN THE OPPORTUNITY TO PERFORM THE RI/FS UNDER EPA SUPERVISION. HOWEVER, NONE OF THEM ELECTED TO UNDERTAKE THESE ACTIVITIES. AFTER THE RI/FS WAS COMPLETED, A 30-DAY PUBLIC COMMENT PERIOD WAS PROVIDED, ENDING IN SEPTEMBER 19, 1988. UPON REQUEST, THIS DEADLINE WAS EXTENDED TO SEPTEMBER 22, 1988 FOR TWO OF THE IDENTIFIED PRPS. IT IS ANTICIPATED THAT SPECIAL NOTICE LETTERS WILL BE SENT OUT TO THE PREVIOUSLY IDENTIFIED PRPS UPDATING THE STATUS OF THE SITE AND PROVIDING THEM WITH THE OPPORTUNITY TO PERFORM THE REMEDIAL DESIGN AND REMEDIAL ACTION PHASES OF THE PROJECT.

#### **#CRA**

##### **COMMUNITY RELATIONS ACTIVITIES**

A COMMUNITY RELATIONS PLAN FOR THE REICH FARM SITE WAS FINALIZED IN JULY 1983. THIS DOCUMENT LISTS CONTACTS AND INTERESTED PARTIES THROUGHOUT GOVERNMENT AND THE LOCAL COMMUNITY. IT ALSO ESTABLISHES COMMUNICATION PATHWAYS TO ENSURE TIMELY DISSEMINATION OF PERTINENT INFORMATION.

A PUBLIC MEETING WAS HELD ON JANUARY 29, 1986 TO DISCUSS THE WORK PLAN FOR THE PRELIMINARY RI AND TO INFORM



THE PUBLIC ABOUT THE SUPERFUND PROGRAM AND THE HISTORY AND STATUS OF THE SITE. EPA FINALIZED THE WORK PLAN FOR THE SUPPLEMENTAL RI/FS IN SEPTEMBER 1987 AND PLACED THIS DOCUMENT IN THE THREE INFORMATION REPOSITORIES ESTABLISHED FOR THE SITE. UPON COMPLETION OF THE RI/FS REPORTS, THEY WERE SENT TO THE REPOSITORIES TO INITIATE THE PUBLIC COMMENT PERIOD, WHICH EXTENDED FROM AUGUST 17, 1988 TO SEPTEMBER 19, 1988. A PUBLIC MEETING WAS HELD ON AUGUST 30, 1988 TO PRESENT THE RESULTS OF THE RI/FS AND THE PREFERRED REMEDIAL ALTERNATIVE FOR THE SITE DEVELOPED BY EPA. ALL COMMENTS WHICH WERE RECEIVED BY EPA BEFORE THE END OF THE PUBLIC COMMENT PERIOD, INCLUDING THOSE WHICH WERE SUBMITTED VERBALLY AT THE PUBLIC MEETING, ARE ADDRESSED IN THE RESPONSIVENESS SUMMARY WHICH IS ATTACHED, AS APPENDIX 1, TO THIS DOCUMENT.

## **#RO**

### **REMEDIAL OBJECTIVES**

THE REMEDIAL ALTERNATIVES PRESENTED IN THIS DOCUMENT ARE BASED ON THE FINDINGS OF THE REMEDIAL INVESTIGATIONS AT THE SITE AND FOCUS ON CONTAMINATION OF THE GROUND WATER BY 1,1,1-TRICHLOROETHANE (TCA), TRICHLOROETHENE (TCE) AND TETRACHLOROETHENE (PCE), AND OF THE SOIL BY VOLATILE AND SEMI-VOLATILE ORGANIC CONTAMINANTS. ALTERNATIVES ADDRESSING CLEANUP OF THE GROUND WATER WILL BE PRESENTED SEPARATELY FROM THOSE DEALING WITH SOIL REMEDIATION.

IN GENERAL, ARARS ARE PROMULGATED AND LEGALLY ENFORCEABLE TO ADDRESS A SPECIFIC CONTAMINANT (SUCH AS TCE), SPECIFIC LOCATION (SUCH AS A WETLAND), OR SPECIFIC ACTION (SUCH AS AIR STRIPPING). CONTAMINANT SPECIFIC ARARS CAN BE APPLIED TO THE RI RESULTS BEFORE ANY REMEDIAL ALTERNATIVES ARE DEVELOPED. THE FEDERAL AND STATE ARARS WHICH HAVE BEEN ESTABLISHED FOR GROUND WATER ARE PRESENTED IN TABLE 1 (PARTS C AND D). IF AVAILABLE TECHNOLOGIES EXIST THAT CAN MEET OR EXCEED THE MOST STRINGENT ARARS, THESE STANDARDS ARE USED TO DEVELOP THE CLEANUP OBJECTIVES (CRITERIA) FOR THE SITE REMEDY.

THE MCLS ESTABLISHED BY THE STATE OF NEW JERSEY, WHICH ARE MORE STRINGENT THAN THE FEDERAL STANDARDS FOR TCA, TCE AND PCE ARE AS FOLLOWS: 26 PARTS PER BILLION (PPB) FOR TCA, 1 PPB FOR TCE, AND 1 PPB FOR PCE. THESE COMPOUNDS WERE ALL DETECTED ABOVE THESE CRITERIA IN A NUMBER OF GROUND WATER SAMPLES. THEREFORE, REMOVAL OF THESE COMPOUNDS FROM THE GROUND WATER IS CONSIDERED AN OBJECTIVE OF THE CLEANUP. THE NEW JERSEY MCL FOR MC IS 2 PPB. ALTHOUGH MC WAS DETECTED ABOVE THIS LEVEL IN A SMALL NUMBER OF GROUND WATER SAMPLES, THESE DETECTIONS ARE THOUGHT TO BE A RESULT OF FIELD OR LABORATORY CONTAMINATION. CONSEQUENTLY, REMOVAL OF MC FROM THE GROUND WATER IS NOT CONSIDERED A REMEDIAL OBJECTIVE. ADDITIONAL SAMPLING MUST BE PERFORMED TO DETERMINE THE SOURCE OF THE MC WHICH WAS DETECTED. IF THIS SAMPLING INDICATES THAT MC IS INDEED A GROUND WATER CONTAMINANT AT REICH FARM, ANY GROUND WATER REMEDIATION UNDERTAKEN AT THE SITE WILL ADDRESS REDUCTION OF THE CONCENTRATION OF MC IN THE GROUND WATER TO LEVELS BELOW THE NEW JERSEY MCL.

IN ADDITION TO ATTAINING THE MOST STRINGENT ARARS, THE REDUCTION OF THE CONCENTRATIONS OF ALL CONTAMINANTS TO HEALTH PROTECTIVE LEVELS IS ANOTHER OBJECTIVE OF THE SITE REMEDY. THE PHE CONDUCTED AT THE REICH FARM SITE SHOWED ACETONE AND BEHP TO BE CONTAMINANTS OF CONCERN IN THE GROUND WATER. THE HEALTH PROTECTIVE LEVELS WHICH WERE CALCULATED FOR THESE CONTAMINANTS ARE 25 PPB FOR BEHP AND 3.5 PPM FOR ACETONE. ONE ACETONE SAMPLE AND TWO BEHP SAMPLES EXCEEDED THESE LEVELS. DUE TO THE QUESTIONABLE NATURE OF THE BEHP AND ACETONE DETECTIONS IN THE GROUND WATER, CLEANUP OF THESE COMPOUNDS IS NOT PRESENTLY CONSIDERED A REMEDIAL OBJECTIVE BUT ADDITIONAL SAMPLING IS NECESSARY TO DETERMINE THE TRUE MAGNITUDE OF BEHP AND ACETONE CONTAMINATION IN THE GROUND WATER. THIS ADDITIONAL SAMPLING SHOULD BE CONDUCTED AT THE INITIATION OF THE DESIGN OF THE SITE REMEDY. IF THIS SAMPLING INDICATES THAT THE CONCENTRATIONS OF BEHP AND ACETONE EXCEED THEIR RESPECTIVE HEALTH PROTECTIVE LEVELS, CLEAN UP TO THESE LEVELS WILL THEN BE CONSIDERED A REMEDIAL OBJECTIVE OF THE SITE REMEDY.

AT THIS TIME, NO ARARS EXIST FOR REMEDIATION OF SOIL CONTAMINATED WITH ORGANICS. HOWEVER, NJDEP HAS DEVELOPED SOIL ACTION LEVELS OF 1 PPM OF TOTAL VOLATILE ORGANICS AND 10 PPM OF TOTAL SEMI-VOLATILE ORGANICS. THESE LEVELS WILL BE USED AS CLEANUP OBJECTIVES FOR THE SOIL REMEDIATION ASPECT OF THE SITE REMEDY. THE PHE DETERMINED THAT THE ONLY HEALTH RISK WHICH MAY RESULT FROM THE CONTAMINATED SOILS ON-SITE INVOLVES THE MIGRATION OF CONTAMINANTS INTO THE GROUND WATER. IT IS BELIEVED THAT CLEANUP TO THE NJDEP ACTION LEVELS WILL HELP ENSURE THAT THIS MIGRATION IS PREVENTED.

TABLE 3 SUMMARIZES THE INFLUENCING FACTORS IN THE SELECTION OF REMEDIAL OBJECTIVES FOR CLEANUP OF THE REICH FARM SITE.

#RA

## REMEDIAL ALTERNATIVES

THIS SECTION DESCRIBES THE REMEDIAL ALTERNATIVES WHICH WERE DEVELOPED, USING SUITABLE TECHNOLOGIES, TO MEET THE OBJECTIVES OF THE NATIONAL OIL AND HAZARDOUS SUBSTANCES CONTINGENCY PLAN AND THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT. THESE ALTERNATIVES WERE DEVELOPED BY SCREENING A WIDE RANGE OF TECHNOLOGIES FOR THEIR APPLICABILITY TO SITE-SPECIFIC CONDITIONS AND EVALUATING THEM FOR EFFECTIVENESS, IMPLEMENTABILITY, AND COST.

A COMPREHENSIVE LIST OF CANDIDATE REMEDIAL TECHNOLOGIES WAS COMPILED TO CHARACTERIZE EACH TECHNOLOGY AND DETERMINE ITS APPLICABILITY TO THE SITE. THE ORIGINAL LIST FOR GROUND WATER REMEDIATION IS INCLUDED AS TABLE 4. THE SOIL REMEDIAL TECHNOLOGIES ARE LISTED IN TABLE 5. EACH TABLE ALSO PROVIDES A BRIEF RATIONALE AS TO WHY A PARTICULAR TECHNOLOGY WAS EXCLUDED FROM FURTHER CONSIDERATION. THE TECHNOLOGIES THAT WERE RETAINED AFTER THE PRELIMINARY SCREENING PROCESS WERE ASSEMBLED IN VARIOUS COMBINATIONS TO FORM FOUR GROUND WATER ALTERNATIVES AND SIX SOIL ALTERNATIVES.

THE COMPONENTS OF EACH OF THE GROUND WATER AND SOIL ALTERNATIVES DEVELOPED FOR THE REICH FARM SITE ARE DESCRIBED BELOW AND THE PRESENT WORTH COST ESTIMATES FOR THESE ALTERNATIVES ARE LISTED IN TABLE 6. ALTERNATIVES ADDRESSING CLEANUP OF THE GROUND WATER WILL BE PRESENTED SEPARATELY FROM THOSE ADDRESSING SOIL REMEDIATION TO MAINTAIN CONSISTENCY WITH THE FEASIBILITY STUDY REPORT AND THE PROPOSED REMEDIAL ACTION PLAN. GROUND WATER ALTERNATIVES ARE PREFIXED WITH GW AND SOIL ALTERNATIVES WITH S.

#GWA

## GROUND WATER ALTERNATIVES

ALTERNATIVE GW-L: NO REMEDIAL ACTION

THIS ALTERNATIVE WOULD NOT DIRECTLY ADDRESS OR REDUCE SITE CONTAMINATION AND ITS ASSOCIATED RISKS. UNDER CURRENT SITE CONDITIONS, CONTAMINANT MOVEMENT AND DISPERSION SHOULD CONTINUE TO FOLLOW THE PATH OF NATURAL GROUND WATER FLOW, WHICH MAY SIGNIFICANTLY IMPACT WATER QUALITY SOUTH-SOUTHWEST OF THE SITE. THEREFORE, A COMPREHENSIVE GROUND WATER SAMPLING PROGRAM WOULD BE IMPLEMENTED TO TRACK THE MOVEMENT OF THE CONTAMINANT PLUME. THE MONITORING WELLS ON-SITE WOULD BE SAMPLED EVERY SIX MONTHS AND ANALYZED FOR PRIORITY POLLUTANTS UNTIL THE GROUND WATER PLUME IS ATTENUATED TO HEALTH BASED LEVELS.

ALTERNATIVE GW-2: PUMP/TREAT USING AIR STRIPPING AND CARBON

ADSORPTION/REINJECT TREATED GROUND WATER

UNDER ALTERNATIVE GW-2, EXTRACTION WELLS WOULD BE INSTALLED TO WITHDRAW CONTAMINATED GROUND WATER FOR TREATMENT. THE PLACEMENT OF THESE EXTRACTION WELLS WOULD BE DETERMINED AFTER ADDITIONAL GROUND WATER SAMPLING. THIS SAMPLING WOULD BE CONDUCTED AS PART OF THE REMEDIAL DESIGN AND WOULD SERVE TO DELINEATE THE FULL DOWNGRAIENT EXTENT OF THE CONTAMINANT PLUME ORIGINATING FROM THE REICH FARM SITE. ANY EXISTING WELLS LOCATED DOWNGRAIENT OF THE SITE WOULD BE SAMPLED; IF ADDITIONAL INFORMATION IS NECESSARY, NEW MONITORING WELLS WOULD BE INSTALLED IN THIS AREA. THE EXTRACTION WELLS WOULD THEN BE PLACED SO THAT THEY WOULD MOST EFFECTIVELY AND EFFICIENTLY CAPTURE THE PLUME. BASED ON THE KNOWN EXTENT OF THE CONTAMINANT PLUME, THE GROUND WATER WOULD NEED TO BE EXTRACTED AT A RATE OF APPROXIMATELY 60 GALLONS PER MINUTE IN ORDER TO CAPTURE THE ENTIRE PLUME.

THE EXTRACTED GROUND WATER WOULD BE TREATED VIA AIR STRIPPING FOLLOWED BY CARBON ADSORPTION. AIR STRIPPING INVOLVES INJECTING HEATED AIR INTO CONTAMINATED WATER AND EXTRACTING THE OFF-GASES, WHICH CONTAIN THE VOLATILE ORGANICS THAT WERE REMOVED FROM THE GROUND WATER, BY PUMPING. IN THIS TREATMENT SCHEME, THE CARBON ADSORBER WHICH FOLLOWS THE AIR STRIPPER IS USED AS A "POLISHING UNIT" TO REMOVE ANY TRACE VOLATILE ORGANICS, AND ANY SEMI-VOLATILE ORGANICS WHICH REMAIN IN THE GROUND WATER. TREATABILITY STUDIES PERFORMED DURING THE REMEDIAL INVESTIGATION HAVE SHOWN THIS TREATMENT METHOD TO BE CAPABLE OF REMOVING THE CONTAMINANTS OF CONCERN FROM THE GROUND WATER. THE EMISSIONS FROM THE AIR STRIPPER WOULD BE MONITORED AND, IF NECESSARY, THE OFF-GASES WOULD BE TREATED BY A VAPOR PHASE CARBON FILTER BEFORE THEY ARE RELEASED TO THE ATMOSPHERE TO ENSURE THAT ALL AIR EMISSION STANDARDS ARE ATTAINED. THE TREATED GROUND WATER WOULD BE DISCHARGED TO INJECTION WELLS UPGRADIENT OF THE SITE. IN ORDER TO EVALUATE THE PERFORMANCE OF THIS REMEDIAL ACTION,

SAMPLING AND TESTING OF THE GROUND WATER BEFORE AND AFTER TREATMENT WOULD BE REQUIRED. THIS TYPE OF PERFORMANCE MONITORING WOULD ALSO BE NECESSARY FOR ALL OF THE GROUND WATER TREATMENT ALTERNATIVES DESCRIBED BELOW.

ALTERNATIVE GW-3: PUMP/TREAT USING CARBON ADSORPTION/REINJECT TREATED GROUND WATER

THIS ALTERNATIVE USES THE SAME PUMPING SYSTEM AS ALTERNATIVE GW-2. THE GROUND WATER WOULD BE TREATED VIA TWO GRANULAR ACTIVATED CARBON ADSORBERS PLACED IN SERIES. IN THIS TYPE OF TREATMENT, THE CONTAMINATED GROUND WATER IS PASSED THROUGH A BED OF CARBON. THE CONTAMINANTS LEAVE THE GROUND WATER AND ARE ADSORBED ONTO THE SURFACE OF THE CARBON PARTICLES. WHEN THE CARBON PARTICLES BECOME SATURATED WITH THE CONTAMINANTS, THEY MUST BE REPLACED. A PILOT TEST WOULD BE CONDUCTED TO DETERMINE THE FREQUENCY OF CHANGE OF THE ACTIVATED CARBON. THE SPENT CARBON WOULD BE COLLECTED BY THE EQUIPMENT SUPPLIER AND SHIPPED FOR OFF-SITE DISPOSAL OR FOR TREATMENT AND REUSE. THE EFFICIENCY OF EACH ADSORBER TO REMOVE THE CONTAMINANTS FROM THE GROUND WATER IS A FUNCTION OF THE SIZE OF THE CARBON BED. THE REINJECTION SCHEME FOR THIS ALTERNATIVE WOULD ALSO BE THE SAME AS DESCRIBED FOR ALTERNATIVE GW-2.

ALTERNATIVE GW-4: PUMP/TREAT USING H2O2-UV OXIDATION/REINJECT

TREATED GROUND WATER

THIS ALTERNATIVE IS SIMILAR TO ALTERNATIVE GW-2 EXCEPT THAT THE CONTAMINATED GROUND WATER WOULD BE TREATED BY CHEMICAL OXIDATION INSTEAD OF AIR STRIPPING. THIS CHEMICAL OXIDATION EMPLOYS A COMBINATION OF HYDROGEN PEROXIDE (H2O2) AND ULTRAVIOLET (UV) LIGHT TO CHEMICALLY OXIDIZE THE VOLATILE ORGANIC CONTAMINANTS IN THE GROUND WATER. THE OXIDATION PROCESS CONVERTS THE VOLATILE ORGANICS TO CARBON DIOXIDE, WATER, AND NON-HAZARDOUS SALTS. THE CONTAMINANT REMOVAL EFFICIENCY OF THE UNIT IS A FUNCTION OF THE LENGTH OF TIME THAT THE GROUND WATER IS RETAINED IN THE OXIDATION CHAMBER. THE CARBON ADSORBER WOULD SERVE THE SAME FUNCTION AS IN ALTERNATIVE GW-2. THE PUMPING AND REINJECTION SCHEME WOULD BE THE SAME AS DESCRIBED IN ALTERNATIVE GW-2.

#SA

#### SOIL ALTERNATIVES

THE FOLLOWING SOIL ALTERNATIVES, WITH THE EXCEPTION OF NO ACTION, INVOLVE THE REMEDIATION OF "HOT SPOTS" IN THE SUBSURFACE SOILS. AN AREA WAS DESIGNATED AS A "HOT SPOT" IF THE CONCENTRATION OF CONTAMINANTS IN THE SOIL EXCEEDED THE NEW JERSEY SOIL ACTION LEVELS. FOR THOSE ALTERNATIVES WHICH INVOLVE TREATMENT, THE AMOUNT OF SOIL REQUIRING REMEDIATION IS ESTIMATED. TESTING WILL BE PERFORMED DURING THE REMEDIAL ACTION TO ENSURE THAT ALL SOILS WITH CONTAMINANT CONCENTRATIONS ABOVE THE ACTION LEVELS ARE TREATED.

ALTERNATIVE S-1: NO REMEDIAL ACTION

THE NO ACTION SOIL CLEANUP ALTERNATIVE CONSISTS OF A LONG-TERM MONITORING AND CONTROL PROGRAM. WARNING SIGNS WILL BE POSTED AT THE SITE TO ALERT THE COMMUNITY OF THE PRESENCE SUBSURFACE SOIL CONTAMINATION. A LONG-TERM MONITORING PROGRAM WOULD BE IMPLEMENTED TO ASSESS THE EXTENT OF CONTAMINANT MIGRATION INTO THE GROUND WATER AND TO DETECT UPWARD MIGRATION OF VOLATILE ORGANIC CONTAMINANTS IN THE SOIL. THE CONDITION OF THE WARNING SIGNS WOULD ALSO BE CHECKED. THE MONITORING PROGRAM WOULD INCLUDE, ANNUAL INSPECTION OF THE FACILITIES, AND SAMPLING AND TESTING OF THE GROUND WATER AND SOIL EVERY SIX MONTHS. THE GROUND WATER SAMPLING CAN BE PERFORMED USING EXISTING MONITORING WELLS. THE SOIL SAMPLING WOULD BE CONDUCTED IN THE AREAS CONTAINING HIGH LEVELS OF CONTAMINATION. THIS ALTERNATIVE WOULD NOT PREVENT THE MIGRATION OF CONTAMINANTS FROM THE SOIL TO THE GROUND WATER.

ALTERNATIVE S-2: CAPPING OF HOT SPOTS/INSTALLATION OF GROUT CURTAINS

IN THIS ALTERNATIVE, A MULTI-LAYER CAP WOULD BE PLACED OVER EACH HOT SPOT. A GROUT CURTAIN WOULD THEN BE INJECTED AROUND THE PERIMETER OF EACH AREA. THE GROUT CURTAIN WOULD EXTEND DOWN TO THE WATER TABLE LOCATED 30 FEET BELOW THE SURFACE. THE CAP WOULD CONSIST OF A SYNTHETIC LINER, A SAND LAYER, A LAYER OF CRUSHED STONE, A LAYER OF COARSE AGGREGATE BITUMINOUS CONCRETE, AND A LAYER OF FINE AGGREGATE BITUMINOUS CONCRETE. THE GROUT CURTAIN IS MADE OF CEMENT MIXED WITH BENTONITE, SOIL AND WATER. THE CAP AND GROUT CURTAIN WOULD SERVE TO ISOLATE EACH HOT SPOT AND THUS PREVENT PERCOLATING WATER FROM AIDING THE MIGRATION OF CONTAMINANTS

INTO THE GROUND WATER. A LONG-TERM MONITORING PROGRAM WOULD BE IMPLEMENTED AS PART OF THIS ALTERNATIVE AND WOULD CONSIST OF INSPECTING THE GROUT CURTAIN AND CAP, AND SAMPLING AND TESTING OF THE GROUND WATER (USING THE EXISTING MONITORING WELLS) EVERY SIX MONTHS. THIS SAMPLING WOULD BE PERFORMED IN ORDER TO DETECT ANY CONTAMINANT RELEASE FROM THE CAPPED AREAS.

#### ALTERNATIVE S-3: SOIL EXCAVATION/ON-SITE INCINERATION/ON-SITE

##### PLACEMENT OF TREATED SOIL

THIS ALTERNATIVE WOULD INVOLVE EXCAVATION OF APPROXIMATELY 2620 CUBIC YARDS OF SOIL, 2010 CUBIC YARDS OF WHICH ARE SUBSURFACE SOILS REQUIRING TREATMENT. THE REMAINING 610 CUBIC YARDS ARE SURFACE SOILS WHICH ARE NOT SIGNIFICANTLY CONTAMINATED. THESE SOILS WOULD BE STORED AND EVENTUALLY USED TO BACKFILL THE EXCAVATED AREAS. THE CONTAMINATED SOIL WOULD BE TREATED IN A MOBILE INCINERATOR BROUGHT TO THE SITE. ALL CONTAMINANTS OF CONCERN IN THE SOIL WOULD BE DESTROYED BY THE INCINERATION PROCESS. THE INCINERATOR SYSTEM WOULD CONTAIN AN AIR POLLUTION CONTROL DEVICE WHICH WOULD COLLECT ANY OFF-GASES PRODUCED AND TREAT THEM FOR PARTICULATE AND ACID GAS REMOVAL BEFORE RELEASE TO THE ATMOSPHERE. THE TREATED SOIL WOULD BE TESTED TO ENSURE THAT THE REMEDIAL OBJECTIVES HAVE BEEN ACHIEVED AND WOULD THEN BE USED AS BACKFILL IN THE EXCAVATED AREAS. THE VENDOR PROVIDING THE EQUIPMENT WOULD BE RESPONSIBLE FOR DISPOSAL OF PARTICULATES AND ACID GAS COLLECTED IN THE AIR POLLUTION SYSTEM, AND ANY WASTE WATER WHICH WAS USED.

#### ALTERNATIVE S-4: SOIL EXCAVATION/OFF-SITE TREATMENT AND DISPOSAL

THE EXTENT OF SOIL EXCAVATION FOR THIS ALTERNATIVE WOULD BE THE SAME AS DESCRIBED IN ALTERNATIVE S-3. THE 2010 CUBIC YARDS OF CONTAMINATED SOIL WOULD BE TRANSPORTED OFF-SITE TO A RCRA PERMITTED FACILITY FOR TREATMENT AND DISPOSAL. TWO FACILITIES IN NEW JERSEY HAVE TENTATIVELY INDICATED THAT THEY ARE CAPABLE OF HANDLING THIS MATERIAL. BOTH FACILITIES ARE EQUIPPED TO INCINERATE THE SOIL. THE FACILITIES ARE APPROXIMATELY FIFTY MILES FROM THE SITE. IT IS ESTIMATED THAT ONE HUNDRED 20-TON TRUCKS WOULD BE REQUIRED TO TRANSPORT THE TOTAL VOLUME OF SOIL. CLEAN FILL, AND THE SURFACE SOILS WHICH WERE EXCAVATED, WOULD BE USED AS BACKFILL.

#### ALTERNATIVE S-5: SOIL EXCAVATION/ENHANCED VOLATILIZATION/ON-SITE PLACEMENT OF TREATED SOIL/OFF-SITE TREATMENT AND DISPOSAL

IN THIS ALTERNATIVE, APPROXIMATELY 1480 CUBIC YARDS OF SOIL WOULD BE EXCAVATED INITIALLY, 1120 CUBIC YARDS OF WHICH ARE SUBSURFACE SOILS CONTAMINATED WITH VOLATILE ORGANICS. THE REMAINING 360 CUBIC YARDS ARE SURFACE SOILS WHICH WOULD BE STORED TEMPORARILY AND LATER USED AS BACKFILL IN THE EXCAVATED AREAS. THE VOLATILE ORGANIC CONTAMINATED SOIL WOULD BE TREATED ON-SITE VIA ENHANCED VOLATILIZATION. IN THIS PROCESS, HOT AIR IS INJECTED INTO A THERMAL PROCESSOR (ROTARY DRYER) CONTAINING THE SOIL TO BE TREATED. THE VOLATILE ORGANICS IN THE SOIL VOLATILIZE INTO THE AIR STREAM AND COMBUST IN AN AFTERBURNER, WHERE THEY ARE DESTROYED. THE OFF-GASES FROM THE AFTERBURNER ARE THEN TREATED IN A SCRUBBER FOR PARTICULATE AND ACID GAS REMOVAL. THE AFTERBURNER CAN BE REPLACED WITH A CARBON ADSORBER TO REMOVE THE VOLATILES FROM THE AIR STREAM. THE CARBON WOULD THEN BE DISPOSED OF, OR REGENERATED, AT AN OFFSITE FACILITY. IN THIS CASE, NO SCRUBBER WOULD BE NEEDED. AFTER TESTING TO ENSURE THAT THE LEVEL OF TOTAL VOLATILE ORGANICS IN THE SOIL IS BELOW 1 PPM, THE TREATED SOIL WOULD BE USED TO BACKFILL THE EXCAVATED AREA.

THE SECOND STAGE OF THIS ALTERNATIVE INVOLVES EXCAVATING ABOUT 1140 CUBIC YARDS OF SOIL, 890 CUBIC YARDS OF WHICH ARE CONTAMINATED WITH SEMI-VOLATILE ORGANICS. SOME SEMI-VOLATILE ORGANICS MAY NOT BE ADEQUATELY REMOVED FROM SOIL BY ENHANCED VOLATILIZATION; THEREFORE, THIS SOIL WOULD BE TAKEN OFF-SITE FOR TREATMENT (VIA INCINERATION) AND DISPOSAL. THE AREA OF THIS EXCAVATION WOULD BE BACKFILLED WITH CLEAN FILL AND THE 250 CUBIC YARDS OF SURFACE SOIL WHICH WERE EXCAVATED BUT DID NOT REQUIRE TREATMENT.

THE VOLUME OF SOIL REQUIRING OFF-SITE TREATMENT (890 CUBIC YARDS) IS A CONSERVATIVELY HIGH ESTIMATE. THIS VALUE WAS USED TO YIELD A CONSERVATIVE COST ESTIMATE FOR THIS ALTERNATIVE BECAUSE OFF-SITE INCINERATION IS A MORE EXPENSIVE TREATMENT METHOD THAN ENHANCED VOLATILIZATION. A TREATABILITY STUDY WOULD BE REQUIRED TO DETERMINE THE ACTUAL AMOUNT OF SOIL WHICH CAN BE SUCCESSFULLY TREATED BY ENHANCED VOLATILIZATION. IT IS LIKELY THAT ENHANCED VOLATILIZATION WOULD BE A VIABLE TREATMENT METHOD FOR A LARGE PERCENTAGE, OR PERHAPS ALL, OF THE CONTAMINATED SOIL; THUS, DECREASING THE COST SIGNIFICANTLY.

## ALTERNATIVE S-6: IN SITU VACUUM EXTRACTION/SOIL EXCAVATION/OFF-SITE TREATMENT AND DISPOSAL

IN SITU VACUUM EXTRACTION INVOLVES THE INSTALLATION OF WELLS AT A DEPTH OF APPROXIMATELY 20 FEET IN THOSE AREAS OF THE SOIL WHICH ARE CONTAMINATED WITH VOLATILE ORGANICS. THE WELLS ARE THEN CONNECTED VIA A PIPE SYSTEM WHICH IS ATTACHED TO A VACUUM PUMP. THE VACUUM PULLS AIR THROUGH THE CONTAMINATED SOILS. THIS AIR, CONTAINING THE VOLATILE ORGANICS WHICH WERE REMOVED FROM THE SOIL, IS THEN FED TO A UNIT TO REMOVE THE VOLATILES. EXCAVATION IS NOT REQUIRED FOR THIS STAGE OF ALTERNATIVE S-6.

THE SECOND STAGE OF THIS ALTERNATIVE WOULD INVOLVE THE TREATMENT OF 1120 CUBIC YARDS OF SOIL. THE TREATMENT METHOD IS THE SAME AS FOR THE SECOND STAGE OF ALTERNATIVE S-5, BECAUSE VACUUM EXTRACTION ALSO IS NOT AN EFFECTIVE TECHNOLOGY FOR THE REMOVAL OF SEMI-VOLATILE ORGANICS FROM SOIL. THERE IS A DIFFERENCE IN THE VOLUME OF SOIL TO BE TREATED AS COMPARED TO THE SECOND STAGE OF ALTERNATIVE S-5 BECAUSE ENHANCED VOLATILIZATION IS CAPABLE OF REMOVING SOME OF THE SEMI-VOLATILE ORGANICS PRESENT IN THE SOIL WHICH CANNOT BE REMOVED BY THE IN SITU VACUUM EXTRACTION PROCESS.

## EVALUATION OF ALTERNATIVES

PERSUANT TO CERCLA, AS AMENDED, EPA MUST EVALUATE EACH ALTERNATIVE WITH RESPECT TO NINE CRITERIA. THESE CRITERIA WERE DEVELOPED TO ADDRESS THE REQUIREMENTS OF SECTION 121 OF SARA. THE NINE CRITERIA ARE: SHORT-TERM EFFECTIVENESS, LONG-TERM EFFECTIVENESS AND PERMANENCE, REDUCTION OF TOXICITY, MOBILITY AND VOLUME, IMPLEMENTABILITY, COST, ATTAINMENT OF ARARS, PROTECTIVENESS, STATE ACCEPTANCE, AND COMMUNITY ACCEPTANCE. THE DISCUSSION WHICH FOLLOWS PROVIDES AN ANALYSIS, RELATIVE TO THESE CRITERIA, OF ALL OF THE ALTERNATIVES UNDER CONSIDERATION FOR CLEANUP OF THE GROUND WATER AND SOIL AT THE REICH FARM SITE.

### SHORT-TERM EFFECTIVENESS

THE SHORT-TERM EFFECTIVENESS CRITERION INVOLVES THE PERIOD OF TIME EACH ALTERNATIVE NEEDS TO ACHIEVE PROTECTION AND ANY ADVERSE IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT THAT MAY BE POSED DURING CONSTRUCTION AND IMPLEMENTATION OF THE ALTERNATIVE.

### GROUND WATER ALTERNATIVES:

ALTERNATIVE GW-1 WOULD TAKE APPROXIMATELY ONE MONTH TO IMPLEMENT AND PRESENTS NO SHORT-TERM RISKS TO ON-SITE WORKERS OR THE COMMUNITY, HOWEVER, IT PROVIDES LITTLE OR NO PROTECTION.

ALTERNATIVES GW-2, GW-3 AND GW-4 PRESENT MINIMAL SHORT-TERM RISKS TO WORKERS THROUGH DIRECT CONTACT PATHWAYS WITH CONTAMINATED WATER RESULTING FROM PIPING LEAKS, AND NORMAL CONSTRUCTION HAZARDS DURING REMEDIAL ACTION. ALTERNATIVE GW-2 PRESENTS A SMALL ADDITIONAL RISK DUE TO EMISSIONS FROM THE AIR STRIPPER. THIS RISK WOULD BE ADDRESSED BY MONITORING TO ENSURE THAT THE AIR EMISSION STANDARDS ARE NOT EXCEEDED. EACH OF THESE ALTERNATIVES WOULD TAKE APPROXIMATELY ELEVEN YEARS TO IMPLEMENT AND WOULD ACHIEVE FULL PROTECTION AT THE END OF THAT TIME. THIS IMPLEMENTATION TIME IS BASED ON NO REMEDIAL ACTION BEING TAKEN FOR THE SOILS ON-SITE. ANY REMEDIAL ACTION ADDRESSING THE CONTAMINATED SOILS WOULD DECREASE THE IMPLEMENTATION TIME FOR THE GROUND WATER ALTERNATIVES.

### SOIL ALTERNATIVES:

ALTERNATIVE S-1 WOULD TAKE ONE MONTH TO IMPLEMENT AND PRESENTS NO SHORT-TERM RISKS TO ON-SITE WORKERS OR THE COMMUNITY; IT DOES NOT ACHIEVE FULL PROTECTION.

ALTERNATIVE S-2 CAN ACHIEVE FULL PROTECTION AGAINST THE CONTAMINANTS OF CONCERN WITHIN A ONE YEAR PERIOD AND PRESENTS MINIMAL SHORT-TERM RISKS TO WORKERS DURING REMEDIAL ACTION THROUGH DIRECT CONTACT PATHWAYS AND THE NORMAL HAZARDS ASSOCIATED WITH THE CONSTRUCTION OF THE CONTAINMENT SYSTEM. THESE HAZARDS WOULD BE ADDRESSED IN A HEALTH AND SAFETY PLAN WHICH WOULD BE DEVELOPED FOR THE CONSTRUCTION ACTIVITIES.

ALTERNATIVES S-3, S-4 AND S-5 WOULD REQUIRE ONE YEAR, AND ALTERNATIVE S-6 WOULD REQUIRE TWO YEARS, TO ACHIEVE FULL PROTECTION. ALTERNATIVES S-3, S-4, S-5 AND S-6 INVOLVE THE EXCAVATION OF CONTAMINATED SOIL AND, CONSEQUENTLY, WOULD INCREASE THE SHORT-TERM RISK TO HUMAN HEALTH DUE TO INCREASED DIRECT CONTACT PATHWAYS AND

CONSTRUCTION HAZARDS DURING EXCAVATION ACTIVITIES. AS STATED ABOVE, THIS CONCERN WOULD BE ADDRESSED IN THE HEALTH AND SAFETY PLAN. IN ADDITION, ALTERNATIVE S-3 INVOLVES ON-SITE INCINERATION WHICH POSES SOME RISK OF EXPOSURE TO AIR EMISSIONS FROM THE INCINERATOR; THESE RISKS ARE MINIMIZED BY THE AIR POLLUTION CONTROL DEVICE WHICH IS AN INTEGRAL PART OF THE INCINERATOR SYSTEM

ALTERNATIVES S-4, S-5 AND S-6 WOULD POSE A MINOR SHORT-TERM RISK OF EXPOSURE TO THE COMMUNITY DURING THE TRANSPORT OF THE SOIL TO AN OFF-SITE FACILITY FOR TREATMENT AND DISPOSAL.

#### LONG-TERM EFFECTIVENESS AND PERMANENCE

LONG-TERM EFFECTIVENESS AND PERMANENCE REFERS TO THE ABILITY OF A REMEDY TO MAINTAIN RELIABLE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT OVER TIME, ONCE CLEANUP GOALS HAVE BEEN MET. IT ALSO ADDRESSES THE MAGNITUDE AND EFFECTIVENESS OF THE MEASURES THAT MAY BE REQUIRED TO MANAGE THE RISK POSED BY TREATMENT RESIDUALS AND/OR UNTREATED WASTES.

#### GROUND WATER ALTERNATIVES:

ALTERNATIVE GW-1 WOULD PRESENT A LONG-TERM RISK TO THE COMMUNITY IF THE CONTAMINANT PLUME MIGRATES OUTSIDE OF THE COHANSEY (UPPER PORTION OF THE KIRKWOOD-COHANSEY AQUIFER SYSTEM) RESTRICTED PRIVATE WELL AREA SURROUNDING THE REICH FARM SITE, OR INTO THE KIRKWOOD (LOWER PORTION OF THE KIRKWOOD-COHANSEY AQUIFER SYSTEM) WHICH HAS FEWER RESTRICTIONS PLACED ON ITS USE AS A POTABLE WELL SOURCE. ALTERNATIVE GW-1 WOULD ONLY TRACK THIS MIGRATION THROUGH MONITORING OF ON-SITE WELLS; IT WOULD NOT PREVENT IT.

ALTERNATIVES GW-2, GW-3 AND GW-4 PRESENT NO LONG-TERM THREAT TO PUBLIC HEALTH BECAUSE THESE ALTERNATIVES CLEAN UP THE AQUIFER TO CONTAMINANT LEVELS WHICH ARE HEALTH PROTECTIVE. THESE ALTERNATIVES UTILIZE PROVEN TECHNOLOGIES (I.E., AIR STRIPPING, CARBON ADSORPTION AND UV-OXIDATION) WHICH HAVE BEEN USED FREQUENTLY FOR TREATMENT OF INDUSTRIAL AND HAZARDOUS WASTE. ALTERNATIVES GW-2 AND GW-4 PROVIDE MORE FLEXIBILITY THAN ALTERNATIVE GW-3 IN THE TYPES OF COMPOUNDS WHICH CAN BE SUCCESSFULLY TREATED BECAUSE THEY UTILIZE MORE THAN ONE TREATMENT TECHNOLOGY. ALL OF THESE ALTERNATIVES ARE RELIABLE AND PRESENT NO MAJOR OPERATIONAL PROBLEMS PROVIDED PROPER MAINTENANCE IS PERFORMED.

#### SOIL ALTERNATIVES:

IN ALTERNATIVE S-1, NONE OF THE CONTAMINATED SOIL ON-SITE WOULD BE REMEDIATED; THEREFORE, A SIGNIFICANT RISK OF CONTAMINANT MIGRATION INTO THE GROUND WATER WOULD REMAIN. THE CONTROL PROGRAM AND WARNING SIGNS WHICH WOULD BE USED IN THIS ALTERNATIVE WOULD RESTRICT PUBLIC ACCESS TO THE SITE; HOWEVER, THEY ARE NOT RELIABLE CONTROL METHODS. THE LONG-TERM GROUND WATER MONITORING PROGRAM WOULD TRACK THE MIGRATION OF CONTAMINANTS FROM THE SOIL INTO THE GROUND WATER, BUT WOULD NOT PREVENT THIS MIGRATION. THE WARNING SIGNS AND MONITORING WELLS WOULD NEED TO BE REPLACED IF DAMAGED.

ALTERNATIVE S-2 WOULD REDUCE THE RISK OF CONTAMINANT MIGRATION INTO THE GROUND WATER BY CONTAINING THE CONTAMINATED SOIL; HOWEVER, IF THE CONTAINMENT SYSTEM WERE TO FAIL, THIS RISK WOULD AGAIN PRESENT ITSELF. THIS ALTERNATIVE WOULD REQUIRE A LONG-TERM MANAGEMENT PROGRAM TO DETECT ANY MIGRATION OF CONTAMINANTS INTO THE GROUND WATER WHICH WOULD INDICATE THAT THE CONTAINMENT SYSTEM HAS FAILED. IN ADDITION, CERCLA REQUIRES THAT ALL ALTERNATIVES WHICH DO NOT INVOLVE TREATMENT OF CONTAMINATED MATERIAL MUST BE REVIEWED AND EVALUATED EVERY FIVE YEARS. ALTERNATIVE S-2 WOULD FALL UNDER THIS PROVISION.

ALTERNATIVES S-3, S-4, S-5 AND S-6 WOULD COMPLETELY REDUCE THE RESIDUAL RISKS ON THE SITE SINCE ALL SIGNIFICANTLY CONTAMINATED SOIL IS REMOVED, TREATED, OR DISPOSED OF OFF-SITE. THERE IS NO NEED FOR LONG-TERM, ON-SITE MANAGEMENT FOR THESE ALTERNATIVES BECAUSE AT THE END OF THE IMPLEMENTATION PERIOD, ALL OF THE CONTAMINATED SOIL HAS BEEN REMEDIATED; THUS, THE SOIL TO GROUND WATER CONTAMINANT MIGRATION ROUTE WOULD BE ELIMINATED. FOR ALTERNATIVES S-3, S-5 AND S-6, WHICH INVOLVE ON-SITE SOIL TREATMENT, A QUALITY CONTROL MONITORING PROGRAM WOULD BE REQUIRED TO ENSURE THAT THE SOIL HAS MET THE REMEDIAL OBJECTIVES AFTER TREATMENT IS COMPLETED. BECAUSE ALTERNATIVE S-6 IS AN IN SITU TREATMENT, CAREFUL MONITORING AND ADDITIONAL SAMPLING WOULD BE NECESSARY TO ENSURE THAT THE SYSTEM IS MEETING ALL PERFORMANCE STANDARDS.

#### REDUCTION OF TOXICITY, MOBILITY OR VOLUME

THIS EVALUATION CRITERION REFERS TO THE ANTICIPATED PERFORMANCE OF THE TREATMENT TECHNOLOGIES, WITH RESPECT TO THESE PARAMETERS, THAT A REMEDY MAY EMPLOY.

#### GROUND WATER ALTERNATIVES:

ALTERNATIVE GW-1 WOULD GRADUALLY REDUCE THE TOXICITY, MOBILITY AND VOLUME OF THE CONTAMINATED GROUND WATER THROUGH NATURAL ATTENUATION (I.E., CONTAMINANTS IN THE GROUND WATER UNDERLYING THE REICH FARM SITE WOULD EVENTUALLY ADHERE TO THE SATURATED SOILS) BUT WOULD NOT PREVENT THE MIGRATION OF CONTAMINANTS INTO POTABLE WELL SOURCES. THERE IS NO RELIABLE MEANS OF CALCULATING THE TIME REQUIRED FOR THIS NATURAL FLUSHING PROCESS TO REDUCE THE CONCENTRATIONS OF THE CONTAMINANTS OF CONCERN IN THE GROUND WATER TO HEALTH PROTECTIVE LEVELS.

ALTERNATIVES GW-2, GW-3 AND GW-4 WOULD SIGNIFICANTLY REDUCE OR COMPLETELY ELIMINATE THE TOXICITY AND VOLUME OF THE CONTAMINATED GROUND WATER BY TREATING IT UNTIL IT ATTAINS HEALTH PROTECTIVE LEVELS. IN THE PROCESS, THE POTENTIAL FOR MIGRATION OF THE CONTAMINATED GROUND WATER IS REDUCED.

#### SOIL ALTERNATIVES:

ALTERNATIVES S-1 AND S-2 WOULD PROVIDE NO REDUCTION OF THE MOBILITY, TOXICITY OR VOLUME OF THE CONTAMINANTS IN THE SOIL. ALTERNATIVES S-3, S-4, S-5 AND S-6 WOULD REDUCE THE TOXICITY, MOBILITY AND VOLUME OF THE CONTAMINANTS ON-SITE BY TREATMENT OR OFF-SITE DISPOSAL.

#### IMPLEMENTABILITY

IMPLEMENTABILITY INVOLVES THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF A REMEDY, INCLUDING THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT THE CHOSEN SOLUTION.

#### GROUND WATER ALTERNATIVES:

ALTHOUGH THE NO ACTION ALTERNATIVE IS THE SIMPLEST TO IMPLEMENT, BASED UPON SITE CONDITIONS AND THE AVAILABILITY OF LAND, ALL OF THE GROUND WATER ALTERNATIVES CAN BE IMPLEMENTED WITH NO MAJOR CONSTRUCTION DIFFICULTIES, AND IN RELATIVELY SHORT PERIODS OF TIME. THE PROPOSED TREATMENT TECHNOLOGIES AND EQUIPMENT REQUIRED FOR ALTERNATIVES GW-2, GW-3 AND GW-4 ARE AVAILABLE AS PREFABRICATED PACKAGES FROM A NUMBER OF VENDORS. THESE PACKAGES CAN BE INSTALLED AS PART OF AN ON-SITE TREATMENT PLANT.

#### SOIL ALTERNATIVES:

ALTERNATIVE S-1 IS THE EASIEST SOIL ALTERNATIVE TO IMPLEMENT. THE REQUIRED SERVICES AND MATERIALS ARE READILY OBTAINED AND NO SPECIAL PIECES OF EQUIPMENT ARE NEEDED. ALTERNATIVE S-2 CAN ALSO BE READILY IMPLEMENTED BECAUSE STANDARD CONSTRUCTION EQUIPMENT IS USED TO INSTALL THE CONTAINMENT SYSTEM. LABOR AND MATERIALS ARE READILY AVAILABLE FOR THIS ALTERNATIVE.

ALTERNATIVES S-3 AND S-5 ARE RELATIVELY EASY TO IMPLEMENT BECAUSE PACKAGED MOBILE UNITS, FOR INCINERATION AND ENHANCED VOLATILIZATION, RESPECTIVELY, ARE AVAILABLE FROM SEVERAL VENDORS. WITH RESPECT TO ALTERNATIVE S-4, THERE ARE EXISTING OFF-SITE FACILITIES CAPABLE OF HANDLING THE CONTAMINATED SOIL. THIS IS TRUE FOR ALL OTHER ALTERNATIVES WHICH INCLUDE OFF-SITE TREATMENT (I.E., S-5 AND S-6). ALTERNATIVE S-6 USES A RELATIVELY NEW TECHNOLOGY WHICH MAY PRESENT MORE DIFFICULTY IN IMPLEMENTATION THAN ANY OF THE OTHER ALTERNATIVES. A PACKAGED MOBILE IN SITU VACUUM EXTRACTION UNIT IS KNOWN TO BE AVAILABLE FROM ONE VENDOR. PILOT SCALE STUDIES WOULD BE REQUIRED FOR THIS ALTERNATIVE.

#### COST

THE COST OF AN ALTERNATIVE INCLUDES BOTH CAPITAL AND OPERATION AND MAINTENANCE (O&M) COSTS. COST COMPARISONS ARE MADE ON THE BASIS OF PRESENT WORTH VALUES. PRESENT WORTH VALUES ARE EQUIVALENT TO THE AMOUNT OF MONEY WHICH MUST BE INVESTED TO IMPLEMENT A CERTAIN ALTERNATIVE AT THE START OF CONSTRUCTION TO PROVIDE FOR BOTH CONSTRUCTION COSTS, AND O&M COSTS OVER TIME. COST ESTIMATES FOR ALL OF THE ALTERNATIVES CAN BE FOUND IN TABLE 6.

#### GROUND WATER ALTERNATIVES:

ALTERNATIVE GW-1 WOULD BE THE LEAST COSTLY TO IMPLEMENT, FOLLOWED BY GW-2, GW-3 AND GW-4. THE PRESENT WORTH VALUE FOR EACH ALTERNATIVE IS AS FOLLOWS:

ALTERNATIVE GW-1: \$ 236,000  
ALTERNATIVE GW-2: \$3,916,000  
ALTERNATIVE GW-3: \$4,100,000  
ALTERNATIVE GW-4: \$5,722,000

#### SOIL ALTERNATIVES:

AGAIN, THE NO ACTION ALTERNATIVE IS THE LEAST COSTLY TO IMPLEMENT, FOLLOWED BY ALTERNATIVES S-2, S-5, S-6, S-3 AND S-4. THE PRESENT WORTH VALUE FOR EACH ALTERNATIVE IS:

ALTERNATIVE S-1: \$ 314,000  
ALTERNATIVE S-2: \$ 877,000  
ALTERNATIVE S-3: \$2,590,000  
ALTERNATIVE S-4: \$3,550,000  
ALTERNATIVE S-5: \$1,916,000  
ALTERNATIVE S-6: \$2,135,000

#### COMPLIANCE WITH ARARS

THIS CRITERION ADDRESSES WHETHER OR NOT A REMEDY WILL MEET ALL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND/OR PROVIDE GROUNDS FOR INVOKING A WAIVER. ARARS CAN BE CONTAMINANT SPECIFIC, LOCATION SPECIFIC, OR ACTION SPECIFIC.

#### GROUND WATER AND SOIL ALTERNATIVES:

ALL ALTERNATIVES EXCEPT NO ACTION WILL MEET ALL APPLICABLE OR RELEVANT AND APPROPRIATE FEDERAL AND STATE ENVIRONMENTAL LAWS.

#### OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THIS CRITERION ADDRESSES WHETHER OR NOT A REMEDY PROVIDES ADEQUATE PROTECTION AND DESCRIBES HOW RISKS ARE ELIMINATED, REDUCED OR CONTROLLED THROUGH TREATMENT, ENGINEERING CONTROLS, OR INSTITUTIONAL CONTROLS.

#### GROUND WATER AND SOIL ALTERNATIVES:

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT IS THE CENTRAL MANDATE OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT. PROTECTION IS ACHIEVED PRIMARILY BY TAKING APPROPRIATE ACTION TO ENSURE THAT THERE WILL BE NO UNACCEPTABLE RISKS TO HUMAN HEALTH OR THE ENVIRONMENT THROUGH ANY EXPOSURE PATHWAYS.

THE ALTERNATIVES EVALUATED, WITH THE EXCEPTION OF NO ACTION, ARE PROTECTIVE OF PUBLIC HEALTH AND THE ENVIRONMENT.

#### STATE ACCEPTANCE

THE STATE OF NEW JERSEY HAS STATED NO OBJECTION TO THOSE ALTERNATIVES WHICH ACTIVELY CLEAN UP CONTAMINATED SOILS AND GROUND WATER.

#### COMMUNITY ACCEPTANCE

#### GROUND WATER ALTERNATIVES:



EXCEPT FOR THE NO ACTION ALTERNATIVE, THE GROUND WATER ALTERNATIVES ARE SIMILAR IN THEIR SHORT-TERM AND LONG-TERM EFFECTIVENESS AND IN THE AMOUNT OF CONSTRUCTION ACTIVITY WHICH WILL BE REQUIRED FOR IMPLEMENTATION. BASED ON THIS, IT SEEMS THAT ALTERNATIVES GW-2, GW-3 AND GW-4 SHOULD BE EQUALLY ACCEPTABLE TO THE COMMUNITY.

#### SOIL ALTERNATIVES:

IT IS LIKELY THAT ALTERNATIVE S-1 WOULD BE UNACCEPTABLE TO THE PUBLIC SINCE IT PROVIDES NO PROTECTION FROM THE MIGRATION OF CONTAMINANTS INTO THE GROUND WATER. ALTERNATIVE S-2 DOES NOT REMOVE OR TREAT THE CONTAMINATED SOIL WHICH MAY NEGATIVELY INFLUENCE PUBLIC OPINION. ALTERNATIVE S-3 INVOLVES ON-SITE INCINERATION WHICH HAS BEEN HISTORICALLY UNFAVORABLE TO LOCAL COMMUNITIES. IN CONTRAST, ALTERNATIVE S-4 INVOLVES TRANSPORT OF CONTAMINATED SOIL OFF-SITE WHICH HAS GENERALLY BEEN THE PREFERENCE OF LOCAL AFFECTED COMMUNITIES. ALTERNATIVES S-5 AND S-6 BOTH INVOLVE ON-SITE TREATMENT AND THE REMOVAL OF SOIL, BUT ALTERNATIVE S-5 CAN BE IMPLEMENTED MORE QUICKLY AND INVOLVES THE REMOVAL A SMALLER AMOUNT OF SOIL FROM THE SITE WHICH SHOULD MAKE IT MORE ACCEPTABLE THAN S-6.

#### #SRSD

#### SELECTED REMEDY/STATUTORY DETERMINATIONS

THE ENVIRONMENTAL PROTECTION AGENCY HAS BEEN EXPLICITLY DIRECTED BY CONGRESS IN SECTION 121 (B) OF CERCLA, AS AMENDED, TO SELECT REMEDIAL ACTIONS WHICH UTILIZE PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY OPTIONS TO THE MAXIMUM EXTENT PRACTICABLE. IN ADDITION, THE AGENCY IS TO PREFER REMEDIAL ACTIONS THAT PERMANENTLY AND SIGNIFICANTLY REDUCE THE MOBILITY, TOXICITY OR VOLUME OF SITE WASTES.

AFTER CAREFUL REVIEW AND EVALUATION OF THE ALTERNATIVES PRESENTED IN THE FEASIBILITY STUDY AS ACHIEVING THE BEST BALANCE OF ALL EVALUATION CRITERIA, EPA PRESENTED ALTERNATIVE GW-2, PUMPING CONTAMINATED GROUND WATER/TREATMENT BY AIR STRIPPING AND CARBON ADSORPTION/REINJECTION OF THE TREATED WATER, AND S-5, EXCAVATION OF CONTAMINATED SOIL/TREATMENT BY ENHANCED VOLATILIZATION OR OFF-SITE INCINERATION/BACKFILLING THE SOIL WHICH WAS TREATED ON-SITE, TO THE PUBLIC AS THE PREFERRED REMEDY FOR THE GROUND WATER AND SOIL, RESPECTIVELY, AT THE REICH FARM SITE. THE INPUT RECEIVED DURING THE PUBLIC COMMENT PERIOD, CONSISTING PRIMARILY OF QUESTIONS AND STATEMENTS SUBMITTED AT THE PUBLIC MEETING HELD ON AUGUST 30, 1988, IS PRESENTED IN THE ATTACHED RESPONSIVENESS SUMMARY. PUBLIC COMMENTS RECEIVED ENCOMPASSED A WIDE RANGE OF ISSUES BUT DID NOT NECESSITATE ANY MAJOR CHANGES IN THE REMEDIAL APPROACH TAKEN AT THE SITE. ACCORDINGLY, THE PREFERRED ALTERNATIVES WERE SELECTED BY EPA AS THE REMEDIAL SOLUTION FOR THE SITE. SOME ADDITIONAL ACTIVITIES WILL BE PERFORMED DURING THE INITIAL PHASES OF THE REMEDIAL DESIGN PROCESS AND PRIOR TO IMPLEMENTATION OF THE SELECTED REMEDIAL ALTERNATIVE. THESE ACTIVITIES ARE DESCRIBED AND JUSTIFIED AS FOLLOWS:

THE HIGH CONCENTRATIONS OF METHYLENE CHLORIDE, ACETONE AND BIS(2-ETHYLHEXYL)PHTHALATE DETECTED IN THE GROUND WATER DURING THE REMEDIAL INVESTIGATION SEEM TO BE ANOMALIES. TESTING OF ON-SITE MONITORING WELLS IS NECESSARY TO DETERMINE WHETHER THESE COMPOUNDS ARE ACTUALLY PRESENT IN THE GROUND WATER AT CONCENTRATIONS ABOVE HEALTH PROTECTIVE LEVELS. IF SAMPLING CONFIRMS THESE HIGH LEVELS, THE TREATMENT METHOD CHOSEN FOR THE GROUND WATER CAN THEN BE ADJUSTED TO ADDRESS REMOVAL OF THESE COMPOUNDS TO HEALTH PROTECTIVE LEVELS. AIR STRIPPING CAN PROVIDE A HIGH DEGREE OF REMOVAL OF ACETONE AND METHYLENE CHLORIDE FROM THE GROUND WATER, AND CARBON ADSORPTION IS AN EFFECTIVE TREATMENT METHOD FOR BEHP. IF NECESSARY, THE REMOVAL EFFICIENCY OF THE UNITS CAN BE ADJUSTED DURING THE DESIGN OF THE GROUND WATER TREATMENT SYSTEM TO REFLECT THE RESULTS OF THE SAMPLING.

EXACT DELINEATION OF THE DOWNGRAIDENT EXTENT OF THE CONTAMINANT PLUME HAS NOT BEEN FULLY ACCOMPLISHED BY THE REMEDIAL INVESTIGATIONS CONDUCTED AT THE SITE. THEREFORE, SAMPLING OF WELLS FURTHER DOWNGRAIDENT THAN THOSE SAMPLED DURING THE REMEDIAL INVESTIGATIONS IS WARRANTED. THIS MAY BE ACCOMPLISHED BY SAMPLING ANY EXISTING DOWNGRAIDENT WELLS WHICH WERE NOT SEALED AS PART OF THE 1974 DOVER TOWNSHIP HEALTH DEPARTMENT ZONING ORDINANCE. IF THERE ARE NOT ENOUGH EXISTING DOWNGRAIDENT WELLS, ADDITIONAL MONITORING WELLS WILL BE INSTALLED AND SAMPLED.

ADDITIONAL SAMPLING OF THE SOILS ON-SITE TO ENSURE THAT ALL SOIL WITH CONCENTRATIONS OF ORGANICS ABOVE THE NEW JERSEY SOIL ACTION LEVELS IS REMEDIATED.

THE COSTS ASSOCIATED WITH THE SELECTED ALTERNATIVE ARE ITEMIZED IN TABLE 6. THE MAJOR COMPONENTS OF THIS

ACTION ARE AS FOLLOWS:

EXTRACTING CONTAMINATED GROUND WATER BY PUMPING FOLLOWED BY ON-SITE TREATMENT THROUGH AIR STRIPPING AND CARBON ADSORPTION AND REINJECTION OF TREATED WATER INTO THE GROUND. THE TREATED WATER WILL BE TESTED TO ENSURE THAT THE TREATMENT METHOD IS MEETING FEDERAL AND STATE STANDARDS. ADDITIONAL PRE-TREATMENT AND POST-TREATMENT UNITS MAY BE REQUIRED TO REMOVE ANY OTHER CONTAMINANTS DETECTED IN THE GROUND WATER DURING FINAL DELINEATION OF THE PLUME. ANY WASTE GENERATED BY THESE ADDITIONAL UNITS WILL BE TREATED TO MEET APPLICABLE DISPOSAL LIMITS. THE REQUIRED TREATMENT PROCESS WILL CONTINUE UNTIL FEDERAL AND STATE CLEANUP STANDARDS ARE ATTAINED TO THE MAXIMUM EXTENT THAT IS TECHNICALLY PRACTICABLE.

CONDUCTING AN ANALYSIS OF THE CONTAMINANT CONCENTRATION LEVELS FOUND IN THE EXHAUST GASES EMITTED BY THE AIR STRIPPING UNIT. THIS ANALYSIS WILL DETERMINE WHETHER ADDITIONAL POST-TREATMENT UNITS ARE REQUIRED TO MEET NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS.

PILOT SCALE TESTING OF THE ENHANCED VOLATILIZATION UNIT TO DETERMINE WHICH COMPOUNDS CAN BE TREATED TO MEET THE NEW JERSEY SOIL ACTION LEVELS BY THIS METHOD.

EXCAVATION, STORAGE AND BACKFILL OF SURFACE SOILS ON-SITE WHICH DO NOT REQUIRE REMEDIATION.

EXCAVATION, STAGING, TREATMENT BY ENHANCED VOLATILIZATION, AND BACKFILL OF SUBSURFACE SOILS. BEFORE BACKFILLING, TESTING WILL BE PERFORMED TO ENSURE THAT CONTAMINANT CONCENTRATIONS IN THE TREATED SOIL ARE BELOW THE NEW JERSEY SOIL ACTION LEVELS.

EXCAVATION, ON-SITE STAGING, AND TRANSPORTATION OFF-SITE TO A RCRA PERMITTED FACILITY FOR TREATMENT AND DISPOSAL, OF SUBSURFACE SOILS WITH CONTAMINATION WHICH CANNOT BE TREATED TO BELOW THE ACTION LEVELS BY ENHANCED VOLATILIZATION.

#### **#PR**

##### **PROTECTIVENESS**

THE SELECTED SITE REMEDY PROTECTS HUMAN HEALTH AND THE ENVIRONMENT BY DEALING EFFECTIVELY WITH THE PRINCIPLE THREATS POSED BY THE REICH FARM SITE. THESE PRINCIPLE THREATS INVOLVE THE INGESTION OF VOLATILE CONTAMINANTS FOUND IN THE GROUND WATER AND THE MIGRATION OF CONTAMINANTS FROM THE SOIL INTO THE GROUND WATER WHERE THEY HAVE THE POTENTIAL TO CAUSE A HEALTH RISK. THE SELECTED ALTERNATIVE ADDRESSES THESE CONTAMINANT PATHWAYS BY CAPTURING AND TREATING THE CONTAMINANT PLUME AND REMOVING AND TREATING THE CONTAMINATED SOIL. THE PRIMARY CONTAMINANTS OF CONCERN IN THE GROUND WATER WHICH WERE IDENTIFIED IN THE RI REPORT ARE 1,1,1-TRICHLOROETHANE, TRICHLOROETHENE, AND TETRACHLOROETHENE. THE CONTAMINANTS OF CONCERN IN THE SOIL INCLUDE BOTH VOLATILE AND SEMI-VOLATILE ORGANICS.

#### **#PFT**

##### **PREFERENCE FOR TREATMENT**

THE STATUTORY PREFERENCE FOR TREATMENT IS SATISFIED BY THE SELECTED REMEDY WHICH EMPLOYS ON-SITE TREATMENT OF THE GROUND WATER THROUGH AIR STRIPPING AND CARBON ADSORPTION. IT ALSO INCLUDES ON-SITE ENHANCED VOLATILIZATION FOR A PORTION OF THE CONTAMINATED SOIL AND OFF-SITE INCINERATION FOR THE REMAINING CONTAMINATED SOIL. THESE TREATMENT METHODS EFFECTIVELY REDUCE THE TOXICITY, MOBILITY AND VOLUME OF THE CONTAMINANTS.

#### **#CE**

##### **COST EFFECTIVENESS**

OF THE ALTERNATIVES WHICH MOST EFFECTIVELY ADDRESS THE PRINCIPLE THREATS POSED BY THE CONTAMINATION AT THE SITE, THE SELECTED ALTERNATIVES AFFORD THE HIGHEST LEVEL OF OVERALL EFFECTIVENESS PROPORTIONAL TO THEIR COST. THE SELECTED ALTERNATIVES ARE COST-EFFECTIVE BECAUSE THEY PROVIDE THE HIGHEST DEGREE OF PROTECTIVENESS AMONG THE ALTERNATIVES EVALUATED WHILE REPRESENTING A REASONABLE VALUE FOR THE MONEY.

## **#UPSAT**

### **UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE**

THE SELECTED REMEDIAL ACTIONS UTILIZE PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE AND PROVIDE THE BEST BALANCE AMONG THE NINE EVALUATION CRITERIA OF ALL OF THE ALTERNATIVES EXAMINED.

THE GROUND WATER TREATMENT WILL REDUCE THE CONTAMINANTS OF CONCERN TO HEALTH PROTECTIVE LEVELS. AFTER TREATMENT IS COMPLETE, THE GROUND WATER WILL NO LONGER PRESENT A POTENTIAL FUTURE RISK TO THE PUBLIC HEALTH; THEREFORE, NEITHER MONITORING NOR MANAGEMENT WILL BE REQUIRED.

THE SOIL TREATMENT WILL PREVENT CONTAMINANTS WHICH ARE CURRENTLY IN THE SOIL FROM MIGRATING INTO THE GROUND WATER WHERE THEY MAY POSE A POTENTIAL HEALTH RISK. AGAIN, WHEN THIS TREATMENT IS COMPLETE, NO LONG-TERM MONITORING OR MANAGEMENT WILL BE REQUIRED. IN ADDITION, NO RESTRICTIONS ON THE USE OF THE SITE WILL BE NECESSARY.

## **#CARAR**

### **COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS**

#### **ACTION-SPECIFIC**

MATERIALS ON-SITE ARE NOT RCRA LISTED WASTES BASED ON CURRENT INFORMATION. IN ADDITION, THESE WASTES ARE NOT EXPECTED TO BE CHARACTERISTIC. THEREFORE, ANY ARARS PERTAINING TO LISTED OR CHARACTERISTIC WASTES ARE NOT APPLICABLE TO THE REICH FARM SITE.

UNDER THE CLEAN AIR ACT, THE NATIONAL AMBIENT AIR QUALITY STANDARDS (AS CONTAINED IN 40 CFR PARTS 50.6, 50.7 AND 50.12) ARE CONSIDERED APPLICABLE FEDERAL REQUIREMENTS FOR LIMITING THE CONCENTRATION OF PARTICULATE MATTER WHICH MAY BE EMITTED FROM THE AIR STRIPPING UNIT AND THE ENHANCED VOLATILIZATION SYSTEM IN THE SELECTED REMEDIAL ACTIONS. THE AMBIENT AIR QUALITY STANDARDS (NJAC 7:27-13) ARE CONSIDERED AN APPLICABLE STATE REQUIREMENTS. RELEVANT AND APPROPRIATE STATE REQUIREMENTS INCLUDE THE EMISSION STANDARDS PROVIDED IN NJAC 7:27-6 (CONTROL AND PROHIBITION OF PARTICULATES FROM MANUFACTURING), AND THE SUBSTANTIVE REQUIREMENTS FOR THE OPERATION OF AIR POLLUTION CONTROL EQUIPMENT UNDER NJAC 7:27-8 (PERMITS AND CERTIFICATES).

SPENT CARBON FROM THE GROUND WATER TREATMENT SYSTEM WILL BE DISPOSED OF OFF-SITE CONSISTENT WITH APPLICABLE RCRA LAND BAN REQUIREMENTS. THE CARBON MAY BE REGENERATED WHICH WOULD ALSO MEET RCRA LAND BAN REQUIREMENTS.

EPA HAS UNDERTAKEN A LAND BAN RULE MAKING THAT APPLIES TO SOIL AND DEBRIS AND WHICH EXTENDS THE TIME PERIOD FOR DISPOSING OF THESE MATERIALS. THEREFORE, THE LAND BAN IS NOT CONSIDERED RELEVANT AND APPROPRIATE AT THIS TIME.

THE REINJECTION PROCESS FOR THE TREATED GROUND WATER WILL MEET UNDERGROUND INJECTION WELL REGULATIONS BY ITS STATUS AS A SUPERFUND REMEDIAL ACTION. THE EXTRACTED GROUND WATER WILL BE TREATED TO MEET DRINKING WATER STANDARDS PRIOR TO REINJECTION.

RCRA CLOSURE REQUIREMENTS ARE RELEVANT AND APPROPRIATE FOR THE TREATED SOILS WHICH WILL BE PLACED BACK ON-SITE AFTER THE ENHANCED VOLATILIZATION PROCESS. THE CLEAN-UP LEVELS WHICH WERE SELECTED FOR THE SOILS ARE CONSISTENT WITH AN ALTERNATIVE CLEAN CLOSURE WHICH WILL NOT REQUIRE LONG-TERM MANAGEMENT OR ENGINEERING CONTROLS.

ANY SOIL WHICH IS TAKEN OFF-SITE FOR TREATMENT AND DISPOSAL WILL BE BROUGHT TO A RCRA PERMITTED FACILITY.

#### **CONTAMINANT-SPECIFIC**

AS OUTLINED IN TABLE 1, PARTS B AND C, THE FEDERAL MCLS UNDER THE SAFE DRINKING WATER ACT ARE PROMULGATED APPLICABLE REQUIREMENTS WHICH LIMIT THE CONCENTRATION OF CONTAMINANTS IN THE TREATED GROUND WATER WHICH IS TO BE RECHARGED ON-SITE THROUGH REINJECTION WELLS. THE MORE STRINGENT NEW JERSEY MCLS WOULD LIMIT THE

CONCENTRATIONS IN THE TREATED EFFLUENT AT THE POINT OF REINJECTION TO LEVELS OF 26 PPB FOR TCA, 1 PPB FOR TCE AND 1 PPB FOR PCE, THE MAJOR CONTAMINANTS IN THE GROUND WATER.

#### LOCATION-SPECIFIC

IN COMPLIANCE WITH THE ENDANGERED SPECIES ACT, A CONSULTATION WITH THE U.S. FISH AND WILDLIFE SERVICE WILL BE CARRIED OUT TO EVALUATE THE POTENTIAL FOR ENCOUNTERING FEDERAL ENDANGERED OR THREATENED SPECIES IN THE VICINITY OF THE REICH FARM SITE. IT IS EXPECTED THAT THE SELECTED REMEDY WILL NOT HAVE ANY DETRIMENTAL IMPACT ON THESE SPECIES BECAUSE OF THEIR TRANSIENT NATURE IN THIS AREA.

THE SITE IS LOCATED LESS THAN ONE MILE FROM A STREAM AND ITS ASSOCIATED WETLANDS, AND IS ADJACENT TO THE FLOODPLAINS OF CONCERN AS DESIGNATED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY. BECAUSE OF THE DISTANCE BETWEEN THE SITE AND THESE RESOURCES, IT IS NOT EXPECTED THAT THE SELECTED REMEDIAL ACTIONS WOULD ADVERSELY IMPACT THEM. HOWEVER, IF THE PROPOSED FUTURE GROUND WATER SAMPLING IDENTIFIES THE PRESENCE OF SITE GENERATED CONTAMINATION AFFECTING THESE RESOURCES, A WETLANDS/FLOODPLAINS ASSESSMENT WILL THEN BE CONDUCTED TO ENSURE COMPLIANCE WITH EXECUTIVE ORDERS 11988 AND 11990 BEFORE THE REMEDIAL ACTION IS IMPLEMENTED.

#TA

TABLE 1

MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

A. SURFACE SOILS (0 -2 FT. DEPTH)

ORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	NEW JERSEY SOIL CLEANUP GUIDELINES
VOLATILES			
ACETONE	3/5	.017	1 PPM
2-BUTANONE	4/5	.011	FOR
TETRACHLOROETHENE	4/5	.022	TOTAL
1,1,1-TRICHLOROETHANE	1/5	.007	VOLATILE
1,2-DICHLOROETHENE	1/5	.001	ORGANICS
TOLUENE	3/5	.099	(NOT
ETHYLBENZENE	3/5	.059	EXCEEDED)
TOTAL XYLENES	3/5	.180	
CHLOROBENZENE	3/5	.100	
SEMI-VOLATILES			
BIS(2-ETHYLHEXYL) PHTHALATE	5/5	5.7	
DI-N-OCTYL PHTHALATE	1/5	.570	
DI-N-BUTYL-PHTHALATE	4/5	.110	10 PPM
BUTYLBENZYL PHTHALATE	2/5	.420	FOR
FLUORANTHENE	1/5	.180	TOTAL
PYRENE	1/5	.110	SEMI
			VOLATILE
			ORGANICS
			(NOT
			EXCEEDED)

TABLE 1 (CONTINUED)

## MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

## A. SURFACE SOILS (0 -2 FT. DEPTH)

INORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	NEW JERSEY SOIL CLEANUP GUIDELINES
ALUMINUM	5/5	4262	NG
BARIUM	5/5	16	400
BERYLLIUM	5/5	.01	1
CALCIUM	5/5	1850	NG
CHROMIUM	5/5	6	100
COBALT	5/5	2	NG
COPPER	5/5	20	170
IRON	5/5	5062	NG
LEAD	5/5	15	250-1000
MAGNESIUM	5/5	241	NG
MANGANESE	5/5	31	NG
SODIUM	5/5	526	NG
VANADIUM	5/5	76	NG
ZINC	5/5	17	350

TABLE 1 (CONTINUED)

## MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

## B. SUBSURFACE SOILS (2 FT. DEPTH)

ORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	NEW JERSEY SOIL CLEANUP GUIDELINES
VOLATILES			
METHYLENE CHLORIDE	6/91	1.300	1 PPM
ACETONE	20/115	12.000	FOR TOTAL
2-BUTANONE	21/126	31.000	VOLATILE
			ORGANICS
			(EXCEEDED)
1,1,1-TRICHLOROETHANE	8/158	.118	
TETRACHLOROETHANE	12/158	13.907	
TOLUENE	17/144	53.000	
CHLOROBENZENE	7/158	36.120	
ETHYLBENZENE	16/158	9.300	
STYRENE	20/158	170.000	
TOTAL XYLENES	17/158	3.597	
2-HEXANONE	5/158	.045	
TRICHLOROETHENE	5/158	.001	
VINYL CHLORIDE	1/158	.001	
CARBON DISULFIDE	2/158	.011	
BENZENE	2/158	.002	
CHLOROFORM	1/158	.001	
4-METHYL-2-PENTANONE	4/158	.047	

TABLE 1 (CONTINUED)  
MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE  
B. SUBSURFACE SOILS (2 FT. DEPTH)

ORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	NEW JERSEY SOIL CLEANUP GUIDELINES
SEMI-VOLATILES			
PHENOL	4/158	6.700	10 PPM FOR SEMI- VOLATILE ORGANICS EXCEEDED
NAPTHALENE	1/158	13.179	
4-CHLORO-3-METHYLPHENOL	1/158	.075	
2-METHYLNAPTHALENE	1/158	5.002	
ACENAPHTHALENE	1/158	10.390	
DIBENZOFURAN	1/158	5.157	
N-NITRODIPHENYLAMINE	5/158	.083	
FLUORENE	1/158	7.043	
PHENANTHRENE	1/158	24.843	
ANTHRACENE	2/158	2.641	
FLUORANTHENE	3/158	13.365	
PYRENE	5/158	7.911	
DI-N-BUTYLPHTHALATE	41/140	5.400	
BUTYLBENZYLPHTHALATE	17/157	74.836	
DIEETHYLPHTHALATE	12/158	.017	
2-CHLOROPHENOL	2/158	.340	
1,3-DICHLOROBENZENE	2/158	15.000	
1,4-DICHLOROBENZENE	2/157	64.000	
1,2-DICHLOROBENZENE	4/157	95.000	
NAPTHALENE	1/158	13.179	
1,2,4-TRICHLOROBENZENE	5/158	6.600	
BIS(2-ETHYLHEXYL)PHTHALATE	49/137	742.064	
DI-N-OCTYLPHTHALTE	7/156	1.900	



TABLE 1 (CONTINUED)

## MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

## B. SUBSURFACE SOILS (2 FT. DEPTH)

INORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	NEW JERSEY SOIL CLEANUP GUIDELINES
ALUMINUM	104/104	4960	NG
ARSENIC	0/104	ND	20
BARIUM	92/104	80	400
BERYLLIUM	62/101	1	1
CADMIUM	5/104	2.4	3
CALCIUM	82/87	28250	NG
CHROMIUM	85/95	46	100
COBALT	79/104	11	NG
COPPER	68/99	62	170
IRON	103/104	14636	NG
LEAD	26/99	61	250-1000
MAGNESIUM	76/94	8757	NG
MANGANESE	86/105	46	NG
MERCURY	10	.6	1
NICKEL	7/104	158	100
POTASSIUM	50/94	4452	NG
SILVER	0/104	ND	5
ODIUM	62/104	9313	NG
VANADIUM	79/89	43	NG
ZINC	67/86	44	350

TABLE 1 (CONTINUED)

## MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

## C. GROUND WATER (MONITORING WELLS)

ORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED	ARARS	
			STATE* (PPB)	FEDERAL** (PPB)
VOLATILES				
METHYLENE CHLORIDE	4/30	640	2	NG
ACETONE	9/37	74000	NG	NG
TOLUENE	3/45	3	+	2000 \
1,1-DICHLOROETHENE	3/45	1	2	7
1,1-DICHLOROETHANE	6/45	8	+	NG
1,2-DICHLOROETHENE	4/45	7	10	70 \
2-BUTANONE	3/45	320	NG	NG
CHLOROFORM	5/45	1	5, +	NG
1,1,1-TRICHLOROETHANE	15/44	130	26	200
TRICHLOROETHENE	11/45	15	1, +	5
TETRACHLOROETHENE	8/45	19	1, +	5 \
1,2-DICHLOROETHANE	1/45	5	2, +	5
CARBON TETRACHLORIDE	1/45	16	2, +	5
CHLOROBENZENE	1/45	1	4, +	60 \ \
ETHYLBENZENE	1/45	1	+	700 \
SEMI-VOLATILES				
PHENOL	1/45	4	3500	NG
BIS- ( 2-ETHYLHEXYL ) PHTHALATE	18/44	2200	NG	21000 C
N-NITROSODIPHENYLAMINE	1/45	6	NG	NG
DI-N-OCTYLPHTHALATE	1/45	4	NG	NG

TABLE 1 (CONTD).

## MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

## C. GROUND WATER (MONITORING WELLS) CONTINUED

INORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	ARARS	
			STATE* (PPB)	FEDERAL* (PPB)
ALUMINUM	18/18	2620	NG	NG
ANTIMONY	1/18	65	NG	NG
BARIUM	10/18	83	1000	4700 \
CADMIUM	2/18	6	3.7	5 \
CALCIUM	18/18	16500	NG	NG
CHROMIUM	6/16	615	50 }	100 \
COPPER	8/17	127	NG	1300 \
IRON	18/18	41300	NG	300 S
LEAD	7/17	56	50	50 P
MAGNESIUM	18/18	3780	NG	NG
MANGANESE	18/18	318	NG	50 S
MERCURY	3/18	.6	2 }	2 P
NICKEL	9/18	97	13.4	NG
POTASSIUM	18/18	671	NG	NG
SILVER	1/18	20	50	50 P
SODIUM	18/18	41800	NG	NG
VANADIUM	4/18	12	NG	NG
ZINC	11/16	1800	NG	5000 S
CYANIDE	0/16	18	200	NG

TABLE 1 (CONTD).  
MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE  
D. GROUND WATER (OFF-SITE POTABLE WELLS)

ORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	ARARS	
			STATE* (PPB)	FEDERAL* (PPB)
VOLATILES				
METHYLENE CHLORIDE	0/11	ND	2	NG
TOLUENE	1/23	1	+	2000
ACETONE	0/22	ND	NG	NG
TRICHLOROETHENE	4/23	2	1, +	5
2-BUTAONE	6/18	14	NG	NG
CARBON TETRACHLORIDE	1/23	7	2, +	5
TETRACHLOROETHANE	3/23	5	1, +	5 \
1,1,1-TRICHLOROETHENE	1/23	5	26	200
4-METHYL-2-PENTANONE	1/23	2	NG	NG
CHLOROFORM	1/23	3	5, +	NG
BENZENE	1/23	1	1, +	5
SEMI VOLATILES				
BIS (2-ETHYLHEXYL PHTHALATE	2/23	10	NG	21000 S
PENTACHLOROPHENOL	1/23	54	NG	220 \\\
2,4-DICHLOROPHENOL	1/23	54	NG	NG
4-CHLORO-3-METHYLPHENOL	1/23	46	NG	NG
DI-N-BUTYL PHALATE	1/23	6	NG	NG
BENZO (K) FLUORANTHENE	1/23	40	NG	NG
PYRENE	1/23	120	NG	NG
SEMI-VOLATILES				
ISOPHORONE	1/23	58	NG	NG
N-NITROSODI-N-PROPYLAMINE	1/23	120	NG	NG
FLUORANTHENE	1/23	58	NG	NG

TABLE 1 (CONTD).

## MAJOR CONTAMINANTS FOUND AT THE REICH FARM SITE

INORGANIC CONTAMINANTS	# OF DETECTS/ # OF SAMPLES TAKEN	MAXIMUM CONCENT- RATION DETECTED (PPM)	ARARS	
			STATE* (PPB)	FEDERAL* (PPB)
ALUMINUM	14/17	783	NG	NG
BARIUM	10/17	80	1000	4700 \
BERYLLIUM	1/17	2	NG	NG
CADMIUM	1/17	273	3.7	5 \
CALCIUM	12/17	5070	NG	NG
CHROMIUM	0/17	ND	50 }	100 \
COBALT	2/17	11	NG	NG
COPPER	12/17	190	NG	1300 \
IRON	14/17	1648	NG	300 S
LEAD	6/17	58	50	50 P
MAGNESIUM	12/17	3250	NG	NG
MANGANESE	12/17	55	NG	50 S
MERCURY	6/17	.7	2	2 P
NICKEL	2/17	86	13.4	NG
POTASSIUM	12/17	3370	NG	NG
SELENIUM	1/17	1.3	10	10 P
SILVER	0/17	ND	50	50 P
SODIUM	17/17	18500	NG	NG
TIN	1/17	58	NG	NG
VANADIUM	2/17	13	NG	NG
ZINC	11/17	1800	NG	5000 S

DATA REPORTING QUALIFIERS

\* ALL STANDARDS ARE NEW JERSEY MAXIMUM CONTAMINANT LEVELS (MCLS) FOR "A-280" CONTAMINANTS (NJAC 7:10-16) UNLESS STATED OTHERWISE.

\*\* ALL STANDARDS ARE SAFE DRINKING WATER ACT MCLS UNLESS STATED OTHERWISE.

+ THE TOTAL CONCENTRATION LIMIT FOR ALL CONTAMINANTS WITH THIS INDICATOR IS 50 PPB IN GROUND WATER.

\ PROPOSED SAFE DRINKING WATER ACT MCL.

\\ MAXIMUM CONTAMINANT LEVEL GOALS (MCLGS) THESE ARE NOT ARARS.

NJAC 7:9-6 GROUND WATER STANDARDS, NEW JERSEY WATER POLLUTION CONTROL ACT

C CLEAN WATER ACT WATER QUALITY CRITERIA FOR HUMAN HEALTH ADJUSTED FOR DRINKING WATER.

} NEW JERSEY POLLUTION DISCHARGE ELIMINATION SYSTEM (NJPDDES)-GROUND WATER PROTECTION

P SAFE DRINKING WATER ACT PRIMARY STANDARDS (FOR HEALTH CONSIDERATIONS).

S SAFE DRINKING WATER ACT SECONDARY STANDARDS (THESE STANDARDS DO NOT INDICATE A POTENTIAL HEALTH RISK; THEY RELATE TO THE AESTHETIC QUALITY OF DRINKING WATER (I.E., ODOR, TASTE, ETC.)).

NG A VALUE IS NOT GIVEN FOR THIS COMPOUND.

ND SAMPLE WAS ANALYZED FOR THIS COMPOUND BUT IT WAS NOT DETECTED IN THAT SAMPLE.

TABLE 2  
(PAGE 1 OF 2)

POTENTIAL RISKS ASSOCIATED WITH CONTAMINANT PATHWAYS

CONTAMINANT PATHWAY	PLAUSIBLE* EXPOSURE PATHWAY	COMPOUNDS** OF CONCERN	HI	CARCINOGENIC RISK FACTOR
DERMAL CONTACT WITH OR INGES- TION OF SOIL BY TRESPASSERS	YES	NONE	---	----
TRANSPORT OF CONTAMINATION FROM SOIL TO AIR	YES	NONE	---	----
MIGRATION OF CONTAMINANTS FROM SOIL TO SURFACE WATER	NO	----	---	----
+ INGESTION OF CONTAMINATED GROUND WATER ON-SITE	YES	ACETONE	12	----
		BEHP	$1.8 \times 10^{-1}$	$4.4 \times 10^{-5}$
		TCE	---	$2.4 \times 10^{-6}$
		PCE	$1.6 \times 10^{-2}$	$1.4 \times 10^{-5}$

\* IF AN EXPOSURE PATHWAY WAS CONSIDERED PLAUSIBLE, IT WAS THEN EVALUATED IN THE PUBLIC HEALTH EVALUATION (PHE).

\*\* AN INDICATOR COMPOUND WAS CONSIDERED A COMPOUND OF CONCERN IF IT HAD A HAZARDOUS INDEX (HI) 1 OR A CARCINOGENIC RISK FACTOR  $1 \times 10^{-6}$ .

+ THERE IS PRESENTLY NO RISK FROM THE GROUND WATER ON-SITE BECAUSE IT IS NOT USED AS A POTABLE WATER SOURCE. THIS PATHWAY WAS EVALUATED TO DETERMINE A POTENTIAL FUTURE RISK FROM THIS GROUND WATER.

TABLE 2  
(PAGE 2 OF 2)

CONTAMINANT PATHWAY	PLAUSIBLE* EXPOSURE PATHWAY	COMPOUNDS** OF CONCERN	HI	CARCINOGENIC RISK FACTOR
++ MIGRATION OF CONTAMINATION FROM SOIL TO GROUND WATER	YES	ETHYLBENZENE	1.8	----
		CHLOROBENZENE	86	----

\* IF AN EXPOSURE PATHWAY WAS CONSIDERED PLAUSIBLE, IT WAS THEN EVALUATED IN THE PUBLIC HEALTH EVALUATION (PHE).

\*\* AN INDICATOR COMPOUND WAS CONSIDERED A COMPOUND OF CONCERN IF IT HAD A HAZARDOUS INDEX (HI) 1 OR A CARCINOGENIC RISK FACTOR  $1 \times 10^{-6}$ .

+ THERE IS PRESENTLY NO RISK FROM THE GROUND WATER ON-SITE BECAUSE IT IS NOT USED AS A POTABLE WATER SOURCE. THIS PATHWAY WAS EVALUATED TO DETERMINE A POTENTIAL FUTURE RISK FROM THIS GROUND WATER.



TABLE 3  
(PAGE 1 OF 3)

RATIONALE FOR SELECTION OF REMEDIAL ALTERNATIVES

GROUND WATER OBJECTIVES

COMPOUND/ COMPOUND TYPE	RATIONALE	ACCEPTED AS REMEDIAL OBJECTIVE
METALS	FOUR METALS WERE DETECTED AT LEVELS WHICH EXCEEDED ARARS METAL DETECTIONS WERE SCATTERED THERE WERE A NUMBER OF DETECTIONS IN UPGRADIENT WELLS. NO EVIDENCE THAT METALS WERE DUMPED AT REICH FARM. DETECTIONS DO NOT SEEM TO BE SITE RELATED	NO
1,2 DICHLORO- ETHENE	DETECTED SLIGHTLY ABOVE NEW JERSEY MCL IN ONLY 1/45 MONITORING WELL SAMPLES. DETECTION CONSIDERED AN ANOMALY.	NO
CARBON TETRACHLORIDE	SAME AS ABOVE	NO
METHYLENE CHLORIDE	DETECTED IN FOUR SAMPLES SLIGHTLY ABOVE NEW JERSEY MCL NOT EVALUATED AS AN INDICATOR COMPOUND IN PHE. THE SMALL NUMBER OF DETECTIONS (4/30) AND THE FACT THAT METHYLENE CHLORIDE IS A TYPICAL FIELD AND LABORATORY CONTAMINANT INDICATES THAT THE METHYLENE CHLORIDE DETECTED IS NOT LIKELY PRESENT AT THE SITE. FURTHER TESTING SHOULD BE DONE TO CONFIRM	NO (FURTHER TESTING REQUIRED)

TABLE 3  
(PAGE 2 OF 3)

GROUND WATER OBJECTIVES (CONTINUED)

COMPOUND/ COMPOUND TYPE	RATIONALE	ACCEPTED AS REMEDIAL OBJECTIVE
ACETONE	NO ARARS DETECTED IN ONE SAMPLE ABOVE HEALTH PROTE- TIVE LEVEL CALCULATED IN PHE. CONCENTRATION IN THAT SAMPLE SEEMS TO BE AN ANOMALY BECAUSE IT WAS MUCH HIGHER THAN THE NEXT HIGHEST DETECTION ALSO, ACETONE IS A TYPICAL LABORATORY CONTAMINANT FURTHER TESTING IS REQUIRED	NO  (FURTHER TESTING REQUIRED)
BEHP	DETECTED IN TWO SAMPLES ABOVE HEALTH PROTECTIVE LEVELS DETER- MINED IN PHE. HIGH DETECTIONS SEEM TO BE ANOMALIES. BEHP IS A TYPICAL FIELD AND LABORATORY CONTAMINANT. FURTHER TESTING SHOULD BE DONE	NO  (FURTHER TESTING REQUIRED)
TCE, TCA, PCE	DETECTED ABOVE RESPECTIVE NEW JERSEY MCLS IN A NUMBER OF SAMPLES. PHE SHOWED TCE AND PCE TO BE ABOVE RESPECTIVE HEALTH BASED LEVELS CALCULATED IN PHE. CONSISTENT WITH TYPES OF COMPOUNDS THOUGHT TO HAVE BEEN DUMPED AT THE SITE. DETECTIONS INDICATE A GROUND WATER PLUME.	YES
SOIL OBJECTIVES		
METALS	ONLY ONE DETECTION OF NICKEL ABOVE NEW JERSEY SOIL ACTION LEVELS. NO PATTERN OF METAL CONTAMINATION. NO INDICATION THAT METALS WERE DUMPED AT REICH FARM.	NO

TABLE 3  
(PAGE 3 OF 3)

SOIL OBJECTIVES (CONTINUED)

COMPOUND/ COMPOUND TYPE	RATIONALE	ACCEPTED AS REMEDIAL OBJECTIVE
VOLATILE ORGANICS	WOULD CAUSE A HEALTH RISK IF REACHED MAXIMUM CONCEN- TRATIONS IN GROUND WATER. DETECTED ABOVE NEW JERSEY SOIL CLEANUP ACTION LEVEL OF 1 PPM.	YES
SEMI-VOLATILE ORGANICS	BEHP PRESENTLY DETECTED IN GROUND WATER. IF MAXIMUM CONCENTRATION OF BEHP WAS ATTAINED IN THE GROUND WATER THROUGH MIGRATION FROM THE SOIL, HEALTH BASED LEVELS CALCULATED IN.THE PHE WOULD BE EXCEEDED NO OTHER SEMI-VOLATILE WAS EVALUATED IN THIS MANNER. ABOVE NEW JERSEY SOIL ACTION LEVEL OF 10 PPM	YES

TABLE 4  
(PAGE 1 OF 2)

SCREENING OF REMEDIAL TECHNOLOGIES FOR GROUND WATER

REICH FARM SITE

TECHNOLOGY	ADVANTAGES/ DISADVANTAGES	TECHNOLOGY RETAINED
I. GROUND WATER CONTROL MEASURES		
CAPPING	UPPER PORTION OF SOIL IS NOT SIGNIFICANTLY CONTAMINATED HORIZONTAL MIGRATION OF CONTAMINATION IN GROUND WATER UNAFFECTED	NO
SUBSURFACE BARRIERS	DIFFICULT TO INSTALL BECAUSE THE BARRIER MUST BE KEYED INTO AN IMPERMEABLE LAYER WHICH IS LOCATED AT A DEPTH OF 2500 FEET AT THE SITE.	NO
GROUND WATER PUMPING	EFFECTIVE IN MANIPULATION AND MANAGEMENT OF GROUND WATER TO CONTROL A PLUME. SHOULD BE COMBINED WITH A TREATMENT TECHNOLOGY.	YES
II. ON-SITE TREATMENT		
PHYSICAL TREATMENT		
AIR STRIPPING	MOST EFFECTIVE FOR TREATING VOLATILE ORGANIC CONTAMINANTS MAY REQUIRE AIR EMISSION CONTROLS. TREATABILITY STUDIES HAVE SHOWN IT TO BE EFFECTIVE FOR TREATING THE GROUND WATER AT THE SITE.	YES
STEAM STRIPPING	MORE COSTLY THAN AIR STRIPPING AND THE EXTRA DEGREE OF EFFECTIVENESS IS NOT NECESSARY FOR THE CONDITIONS AT THE SITE.	NO
CARBON ADSORPTION	EFFECTIVE IN REMOVING VOLATILE AND SEMI-VOLATILE ORGANICS IN GROUND WATER. CONTAMINATED CARBON GENERATED WOULD REQUIRE TREATMENT OR DISPOSAL.	YES

TABLE 4  
(PAGE 2 OF 2)

TECHNOLOGY	ADVANTAGES/ DISADVANTAGES	TECHNOLOGY RETAINED
CHEMICAL TREATMENT		
UV OXIDATION	VOLATILE ORGANICS AT THE SITE HAVE BEEN EFFECTIVELY TREATED BY THIS METHOD ELSEWHERE PILOT STUDIES WOULD BE REQUIRED	YES
CHEMICAL OXIDATION/ CHEMICAL REDUCTION	NOT AS EFFECTIVE AS UV OXIDATION. MAY LEAVE ORGANICS IN EFFLUENT	NO

### III. PLACEMENT TECHNOLOGIES

POTW	THERE ARE CURRENTLY NO POTWS IN THE AREA OF THE REICH FARM SITE	NO
REINJECTION OF GROUND WATER	MUST BE COMBINED WITH TREATMENT TECHNOLOGIES. POTENTIAL PROBLEMS INCLUDE CLOGGING AND PLUGGING BY CHEMICAL PRECIPITATION. FEASIBLE FOR SITE BASED ON SITE HYDROLOGY AND AMOUNT OF GROUND WATER REQUIRING TREATMENT.	YES

TABLE 5  
(PAGE 1 OF 3)

SCREENING OF REMEDIAL TECHNOLOGIES FOR SOIL

REICH FARM SITE

TECHNOLOGY	ADVANTAGES/ DISADVANTAGES	TECHNOLOGY RETAINED
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I. CONTAINMENT TECHNOLOGIES

SUBSURFACE BARRIERS	ISOLATION OF SOIL WILL PREVENT CONTAMINANT TRANSPORT TO GROUND WATER. GROUT CURTAIN IS THE MOST EFFECTIVE TYPE OF BARRIER FOR THE SITE.	YES
SINGLE-LAYER CAP	SUSCEPTIBLE TO EROSION. TYPICAL USED AS A TEMPORARY CAP.	NO
MULTI-LAYER CAP	PREVENTS PERCOLATION OF RAIN WATER THROUGH THE CONTAMINATED SOIL. MOST DURABLE TYPE OF CAP MUST BE MONITORED TO INSURE INTEGRITY IS MAINTAINED. SHOULD BE COMBINED WITH A SUBSURFACE BARRIER.	YES

II. TREATMENT TECHNOLOGIES

CHEMICAL TREATMENT

SOLVENT EXTRACTION/ RECOVERY	NOT A PROVEN TECHNOLOGY. ADDITIONAL UNITS REQUIRED TO REMOVE VOLATILE ORGANIC CONTAMINANTS FROM EXTRACTION SOLUTION.	NO
FIXATION	GENERALLY USED FOR SOILS CONTAMINATED WITH METALS. CLAYS IN THE SOIL ON- SITE MAY INTERFERE WITH PROCESS.	NO

THERMAL TREATMENT

INCINERATION	WILL DESTROY ALL ORGANICS IN THE SOIL. BASED ON THE AMOUNT OF SOIL REQUIRING TREATMENT, THERE ARE SEVERAL VENDORS AVAILABLE.	YES
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TABLE 5  
(PAGE 2 OF 3)

TECHNOLOGY	ADVANTAGES/ DISADVANTAGES	TECHNOLOGY RETAINED
ENHANCED VOLATILIZATION	EFFECTIVE IN REMOVING ALL VOLA- TILE AND SOME SEMI-VOLATILE ORGANICS FROM THE SOIL THE RE- MAINING SOIL MUST BE TREATED BY A DIFFERENT METHOD.	YES
THERMOPLASTIC SOLIDIFICATION	SOME OF THE VOLATILE ORGANICS FOUND AT THE SITE DIFFUSE RAPIDLY THROUGH THE MATERIAL WHICH IS CREATED BY THIS PROCESS	NO
IN SITU TREATMENT		
IN SITU BIO- DEGRADATION	IT IS DOUBTFUL THAT ANAEROBIC BIODEGRADATION WOULD DESTROY THE CHLORINATED HYDROCARBONS IN THE SOIL.	NO
SOIL FLUSHING	CLAY LENSES LOCATED THROUGHOUT THE AREA WOULD MAKE IT DIFFICULT TO REMOVE ALL OF THE CONTAMINATION AND RECAPTURE ALL OF THE SOIL WASHING FLUID.	NO
IN SITU VACUUM EXTRACTION	CAN REMOVE VOLATILE ORGANICS FROM THE SOIL. A PILOT SCALE TEST WOULD BE REQUIRED AND THE SEMI- VOLATILE CONTAMINATED SOIL WOULD REQUIRE TREATMENT BY A DIFFERENT METHOD.	YES
IN SITU VITRIFICATION	STILL IN DEVELOPMENT STAGE. PROBLEMS WHICH NEED TO BE CORRECTED INCLUDE ELECTRODE FAILURE AND THE COLLECTION OF OFF-GAS STREAMS.	NO
III. PLACEMENT TECHNOLOGIES		
LANDFILLS	LANDFILLING IS DISCOURAGED BY EPA. RCRA LANDBAN WILL LIMIT THE TYPES OF WASTE WHICH CAN BE DISPOSED IN THE FUTURE.	NO
ON-SITE PLACEMENT	MUST BE USED IN CONJUNCTION WITH TREATMENT. TREATED SOIL WOULD BE NON-HAZARDOUS AND THEREFORE CAN BE USED AS BACKFILL.	YES

TABLE 5  
(PAGE 3 OF 3)

TECHNOLOGY	ADVANTAGES/ DISADVANTAGES	TECHNOLOGY RETAINED
IV. TRANSPORTATION OF SOIL		
TRUCKS	ROAD ACCESS TO SITE IS AVAILABLE PROVIDES FLEXIBILITY IN THE AMOUNT OF SOIL WHICH CAN BE HANDLED SPECIAL FACILITIES ARE NOT REQUIRED	YES
TRAIN	NEAREST RAIL SPUR IS FIVE MILES FROM THE SITE, THEREFORE, TRUCKS WOULD STILL BE REQUIRED	NO
BARGE	NOT APPROPRIATE FOR SMALL AMOUNT OF SOIL. DISTANCE TO NEAREST AVAILABLE WATER BODY IS PROHIBITIVE	NO



#RS

REICH FARM SITE  
PLEASANT PLAINS, DOVER TOWNSHIP  
OCEAN COUNTY, NEW JERSEY  
FINAL RESPONSIVENESS SUMMARY

THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) HELD A PUBLIC COMMENT PERIOD FROM AUGUST 17, 1988 THROUGH SEPTEMBER 19, 1988 FOR INTERESTED PARTIES TO COMMENT ON EPA'S FINAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (RI/FS) AND PROPOSED REMEDIAL ACTION PLAN (PRAP) FOR THE REICH FARM SUPERFUND SITE.

EPA HELD A PUBLIC MEETING ON AUGUST 30, 1988 AT THE DOVER TOWNSHIP MUNICIPAL BUILDING IN TOMS RIVER, NEW JERSEY TO DESCRIBE THE REMEDIAL ALTERNATIVES AND PRESENT EPA'S PREFERRED REMEDIAL ALTERNATIVES FOR THE REICH FARM SITE.

A RESPONSIVENESS SUMMARY IS REQUIRED FOR THE PURPOSE OF PROVIDING EPA AND THE PUBLIC WITH A SUMMARY OF CITIZENS, COMMENTS AND CONCERNS ABOUT THE SITE AS RAISED DURING THE PUBLIC COMMENT PERIOD, AND EPA'S RESPONSES TO THOSE CONCERNS. ALL COMMENTS SUMMARIZED IN THIS DOCUMENT WILL BE FACTORED INTO EPA'S FINAL DECISION FOR SELECTION OF THE REMEDIAL ALTERNATIVES FOR CLEANUP OF THE REICH FARM SITE.

#### I. RESPONSIVENESS SUMMARY OVERVIEW.

THIS SECTION BRIEFLY DESCRIBES THE BACKGROUND OF THE REICH FARM SITE AND OUTLINES THE PROPOSED REMEDIAL ALTERNATIVES.

#### II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS.

THIS SECTION PROVIDES A BRIEF HISTORY OF COMMUNITY INTEREST AND CONCERNS REGARDING THE REICH FARM SITE.

#### III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS.

THIS SECTION SUMMARIZES COMMENTS SUBMITTED TO EPA AT THE PUBLIC MEETING AND DURING THE PUBLIC COMMENT PERIOD AND PROVIDES EPA'S RESPONSES TO THESE COMMENTS.

#### IV. REMAINING CONCERNS.

THIS SECTION DISCUSSES COMMUNITY CONCERNS THAT EPA SHOULD BE AWARE OF AS THEY PREPARE TO UNDERTAKE THE REMEDIAL DESIGNS AND REMEDIAL ACTIONS AT THE REICH FARM SITE.

#### I. RESPONSIVENESS SUMMARY OVERVIEW

THE REICH FARM SITE IS LOCATED IN THE PLEASANT PLAINS SECTION OF DOVER TOWNSHIP, OCEAN COUNTY, NEW JERSEY. THE SITE CONSISTS OF AN OPEN, RELATIVELY FLAT, SANDY AREA ENCOMPASSING APPROXIMATELY ONE ACRE. THE SITE IS ABUTTED BY COMMERCIAL ESTABLISHMENTS ON THE WEST AND WOODED AREAS ON ALL OTHER SIDES.

THE FOLLOWING INFORMATION WAS OBTAINED FROM THE TRW FINAL REPORT ENTITLED "ANALYSIS OF A LAND DISPOSAL DAMAGE INCIDENT INVOLVING HAZARDOUS WASTE MATERIALS," DOVER TOWNSHIP, NEW JERSEY, MAY 1976. MR. AND MRS. SAMUEL REICH, THE OWNERS OF THE PROPERTY, DISCOVERED APPROXIMATELY 4,500 DRUMS CONTAINING WASTES ON A PORTION OF THEIR LAND THAT THEY HAD RENTED TO A MR. NICHOLAS FERNICOLA. THESE DRUMS BORE LABELS INDICATING THAT THEY BELONGED TO UNION CARBIDE CORPORATION. IN ADDITION, TRENCHES, INTO WHICH WASTES WERE BELIEVED TO HAVE BEEN DUMPED, WERE ALSO DISCOVERED ON THE PROPERTY. FROM 1972 TO 1974, UNION CARBIDE CORPORATION REMOVED APPROXIMATELY 5,150 DRUMS AND 1,100 CUBIC YARDS OF VISIBLY CONTAMINATED SOIL AND TRENCHED WASTES FROM THE REICH FARM SITE.

IN AUGUST 1974, 148 PRIVATE WELLS NEAR THE REICH FARM SITE WERE ORDERED CLOSED BY THE DOVER TOWNSHIP BOARD OF HEALTH FOLLOWING AN ANALYSIS PERFORMED ON A NUMBER OF THESE WELLS WHICH REVEALED THE PRESENCE OF ORGANIC

CONTAMINANTS IN THE WATER. BASED ON RECOMMENDATIONS FROM THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP), A ZONING ORDINANCE RESTRICTING THE USE OF GROUNDWATER IN THE AREA OF REICH FARM WAS ESTABLISHED. REICH FARM WAS ONE OF 418 SITES PLACED ON EPA'S PROPOSED NATIONAL PRIORITIES LIST (NPL) OF HAZARDOUS WASTE SITES ISSUED IN DECEMBER 1982.

AT EPA'S DIRECTION, A PRELIMINARY RI WAS CONDUCTED BY NUS CORPORATION IN 1986 AND A SUPPLEMENTAL RI WAS CONDUCTED BY EBASCO SERVICES INCORPORATED IN 1987. THE RESULTS OF THESE INVESTIGATIONS INDICATE THE FOLLOWING:

THE SURFACE SOILS ON-SITE (THOSE SOILS AT DEPTHS OF FIVE FEET OR LESS) SHOW NO SIGNIFICANT CONTAMINATION.

HOT SPOTS" ARE PRESENT IN THE SUBSURFACE SOILS (THOSE SOILS AT DEPTHS OF GREATER THAN FIVE FEET). THESE "HOT SPOTS" ARE CONTAMINATED WITH BOTH VOLATILE AND SEMI-VOLATILE ORGANICS.

GROUNDWATER UNDERLYING AND DOWNGRAIENT OF THE SITE IS ALSO CONTAMINATED WITH LOW LEVELS OF ORGANICS, PREDOMINANTLY TRICHLOROETHENE (TCE), TETRACHLOROETHENE (PCE), AND 1,1,1-TRICHLOROETHANE (TCA).

#### SUMMARY OF REMEDIAL ALTERNATIVES

THE SUPERFUND LAW REQUIRES EACH SITE REMEDY THAT IS SELECTED TO BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, COST-EFFECTIVE, AND IN ACCORDANCE WITH STATUTORY REQUIREMENTS. PERMANENT SOLUTIONS TO CONTAMINATION PROBLEMS ARE TO BE ACHIEVED WHEREVER POSSIBLE.

IN THE COURSE OF THE RI/FS PROCESS, IT WAS DETERMINED THAT REMEDIAL ACTIONS AT THE REICH FARM SITE SHOULD ENCOMPASS BOTH THE GROUNDWATER AND THE SOIL. IN ORDER TO MAINTAIN CONSISTENCY WITH THE FS, ALTERNATIVES ADDRESSING CLEANUP OF THE GROUNDWATER WILL BE PRESENTED SEPARATELY FROM THOSE ADDRESSING SOIL REMEDIATION.

#### GROUNDWATER ALTERNATIVES

THE OBJECTIVES WHICH HAVE BEEN PRELIMINARILY IDENTIFIED FOR REMEDIATION OF THE GROUNDWATER UNDERLYING THE REICH FARM SITE ARE:

- (1) REDUCTION OF TCE TO A CONCENTRATION OF 1 PART PER BILLION (PPB) IN THE GROUNDWATER;
- (2) REDUCTION OF PCE TO A CONCENTRATION OF 1 PPB IN THE GROUNDWATER, AND
- (3) REDUCTION OF TCA TO A CONCENTRATION OF 26 PPB IN THE GROUNDWATER.

THESE CONCENTRATIONS ARE NEW JERSEY MAXIMUM CONTAMINANT LEVELS (MCLS), AND ARE CONSIDERED RELEVANT AND APPROPRIATE REQUIREMENTS FOR CLEANUP OF GROUNDWATER IN THE STATE OF NEW JERSEY.

#### ALTERNATIVE GW-L: NO ACTION

CONSTRUCTION COST: \$0  
ANNUAL O&M COSTS (OPERATION AND MAINTENANCE): \$15,330  
TIME TO IMPLEMENT: 1 MONTH

THIS ALTERNATIVE INCLUDES THE USE OF EXISTING MONITORING WELLS (INSTALLED DURING THE REMEDIAL INVESTIGATIONS) TO CONDUCT LONG-TERM MONITORING OF THE CONTAMINANT CONCENTRATIONS IN THE COHANSEY AQUIFER UNDERLYING THE SITE. UNDER THIS ALTERNATIVE, USE OF GROUNDWATER IN THE AREA WILL CONTINUE TO BE RESTRICTED.

#### ALTERNATIVE GW-2: PUMPING/AIR STRIPPING/CARBON ADSORPTION/REINJECTION

CONSTRUCTION COST: \$905,000  
ANNUAL O&M COSTS: \$390,000  
TIME TO IMPLEMENT: 11 YEARS

UNDER ALTERNATIVE GW-2, EXTRACTION WELLS WILL BE INSTALLED TO WITHDRAW CONTAMINATED GROUNDWATER FOR TREATMENT. THE PLACEMENT OF THESE EXTRACTION WELLS WILL BE DETERMINED AFTER ADDITIONAL GROUNDWATER SAMPLING. THIS SAMPLING WILL BE CONDUCTED AS PART OF THE REMEDIAL DESIGN AND WILL HELP DELINEATE THE FULL EXTENT OF THE CONTAMINANT PLUME ORIGINATING FROM THE REICH FARM SITE. THE EXTRACTION WELLS WILL THEN BE PLACED SO THAT THEY WILL EFFECTIVELY AND EFFICIENTLY CAPTURE THE PLUME. THE EXTRACTED GROUNDWATER WILL BE TREATED BY AIR STRIPPING FOLLOWED BY CARBON ADSORPTION. TREATABILITY STUDIES PERFORMED DURING THE RI HAVE SHOWN THIS TREATMENT SCHEME TO BE CAPABLE OF REMOVING THE CONTAMINANTS OF CONCERN FROM THE GROUNDWATER. THE EMISSIONS FROM THE AIR STRIPPER WILL BE MONITORED AND, IF NECESSARY, THE OFF-GASES WILL BE TREATED BY A VAPOR PHASE GRANULAR ACTIVATED CARBON (GAC) FILTER BEFORE THEY ARE RELEASED TO THE ATMOSPHERE TO ENSURE THAT THE MAXIMUM ALLOWABLE AIR EMISSIONS ARE NOT EXCEEDED. THE TREATED GROUNDWATER WILL BE DISCHARGED TO INJECTION WELLS INSTALLED UPGRADIENT OF THE SITE. IN ORDER TO EVALUATE THE PERFORMANCE OF THIS REMEDIAL ACTION, SAMPLING AND TESTING OF THE GROUNDWATER BEFORE AND AFTER TREATMENT WILL BE REQUIRED. THIS TYPE OF PERFORMANCE MONITORING WILL ALSO BE NECESSARY FOR ALTERNATIVES GW-3 AND GW-4.

#### ALTERNATIVE GW-3: PUMPING/CARBON ADSORPTION/REINJECTION

CONSTRUCTION COST:	\$825,000
ANNUAL O&M COSTS:	\$424,000
TIME TO IMPLEMENT:	11 YEARS

THIS ALTERNATIVE USES THE SAME PUMPING SYSTEM AS ALTERNATIVE GW2, HOWEVER, THE GROUNDWATER WILL BE TREATED VIA TWO GAC ADSORBERS PLACED IN SERIES. THE REINJECTION SCHEME WILL ALSO BE THE SAME AS FOR ALTERNATIVE GW-2.

#### ALTERNATIVE GW-4: PUMPING/H2O2-UV OXIDATION/CARBON ADSORPTION/REINJECTION

CONSTRUCTION COST:	\$1,294,000
ANNUAL O&M COSTS:	\$575,000
TIME TO IMPLEMENT:	12 YEARS

THIS ALTERNATIVE IS SIMILAR TO ALTERNATIVE GW-2 EXCEPT THAT THE CONTAMINATED GROUNDWATER WILL BE TREATED BY CHEMICAL OXIDATION INSTEAD OF AIR STRIPPING. THIS CHEMICAL OXIDATION EMPLOYS A COMBINATION OF HYDROGEN PEROXIDE (H2O) AND ULTRAVIOLET (UV) LIGHT TO CHEMICALLY OXIDIZE THE VOLATILE ORGANIC CONTAMINANTS (VOCs) IN THE GROUNDWATER. THE PUMPING AND REINJECTION SYSTEMS ARE THE SAME AS FOR ALTERNATIVE GW-2.

#### SOIL ALTERNATIVES

THE FOLLOWING SOIL ALTERNATIVES, WITH THE EXCEPTION OF NO ACTION, INVOLVE THE REMEDIATION OF "HOT SPOTS" IN THE SUBSURFACE SOILS. AN AREA WAS DESIGNATED AS A "HOT SPOT" IF THE CONCENTRATION OF CONTAMINANTS IN THE SOIL EXCEEDED THE NEW JERSEY SOIL CLEANUP GUIDELINES OF 1 PPM (PART PER MILLION) OF TOTAL VOLATILE ORGANICS OR 10 PPM OF TOTAL SEMI-VOLATILE ORGANICS. ALTHOUGH THESE GUIDELINES ARE NOT CONSIDERED LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS), CLEANUP TO THESE LEVELS WILL ENSURE THAT THE CONTAMINANTS IN THE SOIL DO NOT MIGRATE INTO THE GROUNDWATER. FOR THOSE ALTERNATIVES WHICH INVOLVE TREATMENT, THE AMOUNT OF SOIL REQUIRING REMEDIATION IS AN ESTIMATED FIGURE. TESTING WILL BE PERFORMED DURING THE REMEDIAL ACTION TO ENSURE THAT ALL SOIL WITH CONTAMINANT CONCENTRATIONS ABOVE THE CLEANUP GUIDELINES IS TREATED.

#### ALTERNATIVE S-L: NO ACTION

CONSTRUCTION COST:	\$0
ANNUAL O&M COSTS:	\$20,000
TIME TO IMPLEMENT:	1 MONTH

THE NO ACTION SOIL CLEANUP ALTERNATIVE CONSISTS OF A LONG-TERM MONITORING AND CONTROL PROGRAM. WARNING SIGNS WILL BE POSTED AT THE SITE TO ALERT PEOPLE TO THE SUBSURFACE SOIL CONTAMINATION. IN ADDITION, MEASURES WILL BE TAKEN TO RESTRICT PUBLIC ACCESS TO THE SITE. TO ASSESS THE MIGRATION OF CONTAMINANTS INTO THE GROUNDWATER, A LONG-TERM MONITORING PROGRAM, USING EXISTING MONITORING WELLS, WILL BE IMPLEMENTED.

ALTERNATIVE S-2: CAPPING/GROUT CURTAIN

CONSTRUCTION COST:	\$500,000
ANNUAL O&M COSTS:	\$25,000
TIME TO IMPLEMENT:	12 MONTHS

IN THIS ALTERNATIVE, A MULTI-LAYER CAP WILL BE PLACED OVER EACH "HOT SPOT". A GROUT CURTAIN WILL THEN BE INJECTED AROUND THE PERIMETER OF EACH AREA. THE GROUT CURTAIN WILL EXTEND DOWN TO THE WATER TABLE LOCATED 30 FEET BELOW THE SURFACE. THE CAP WILL CONSIST OF A SYNTHETIC LINER, A SAND LAYER, A LAYER OF CRUSHED STONE, A LAYER OF COARSE AGGREGATE BITUMINOUS CONCRETE, AND A LAYER OF FINE AGGREGATE BITUMINOUS CONCRETE. THE GROUT CURTAIN IS MADE OF CEMENT MIXED WITH BENTONITE, SOIL AND WATER. A LONG-TERM GROUNDWATER MONITORING PROGRAM, AS DESCRIBED IN THE NO ACTION ALTERNATIVE, WILL BE INCLUDED WITH THIS ALTERNATIVE.

ALTERNATIVE S-3: EXCAVATION/ON-SITE INCINERATION AND PLACEMENT

CONSTRUCTION COST:	\$2,500,000
ANNUAL O&M COSTS:	\$92,000
TIME TO IMPLEMENT:	12 MONTHS

THIS ALTERNATIVE WILL INVOLVE EXCAVATION OF APPROXIMATELY 2,620 CUBIC YARDS OF SOIL, 2,010 CUBIC YARDS OF WHICH WILL BE SUBSURFACE SOIL REQUIRING TREATMENT. THE REMAINING 610 CUBIC YARDS IS SURFACE SOIL WHICH IS NOT SIGNIFICANTLY CONTAMINATED. THIS SOIL WILL BE STORED AND EVENTUALLY USED TO BACKFILL THE EXCAVATED AREAS. THE CONTAMINATED SOIL WILL BE TREATED IN A MOBILE INCINERATOR BROUGHT TO THE SITE. THE INCINERATION SYSTEM WILL CONTAIN A SCRUBBER TO COLLECT ANY OFF-GASES, PRODUCED BY PARTICULATE AND ACID GAS REMOVAL, PRIOR TO RELEASE TO THE ATMOSPHERE. THE TREATED SOIL WILL BE TESTED TO INSURE THAT THE CLEANUP LEVEL GOALS HAVE BEEN ACHIEVED AND WILL THEN BE USED AS BACKFILL IN THE EXCAVATED AREAS.

ALTERNATIVE S-4: EXCAVATION/OFF-SITE TREATMENT AND DISPOSAL

CONSTRUCTION COST:	\$3,550,000
ANNUAL O&M COSTS:	\$0
TIME TO IMPLEMENT:	6 MONTHS

THE EXTENT OF SOIL EXCAVATION FOR THIS ALTERNATIVE WILL BE THE SAME AS DESCRIBED IN ALTERNATIVE S-3. THE 2,010 CUBIC YARDS OF CONTAMINATED OIL WILL BE TRANSPORTED OFF-SITE TO A LICENSED CONTRACTING COMPANY FOR TREATMENT AND DISPOSAL. CLEAN FILL AND THE OVERBURDEN SOIL WILL BE USED TO BACKFILL THE EXCAVATED AREAS.

ALTERNATIVE S-5: EXCAVATION/ENHANCED VOLATILIZATION/ON-SITE

PLACEMENT/OFF-SITE TREATMENT AND DISPOSAL

CONSTRUCTION COST:	\$1,916,000
ANNUAL O&M COSTS:	\$0
TIME TO IMPLEMENT:	9 MONTHS

IN THIS ALTERNATIVE, APPROXIMATELY 1,480 CUBIC YARDS OF SOIL WILL BE INITIALLY EXCAVATED, 1,120 CUBIC YARDS OF WHICH ARE SUBSURFACE SOILS CONTAMINATED WITH VOLATILE ORGANICS. THE REMAINING 360 CUBIC YARDS ARE SURFACE SOILS WHICH WILL BE TEMPORARILY STORED AND LATER USED AS BACKFILL IN THE EXCAVATED AREAS. THE VOLATILE ORGANIC CONTAMINATED SOIL WILL BE STAGED ON SITE AND TREATED VIA AN ENHANCED VOLATILIZATION UNIT. IN THIS FACILITY, HOT AIR WILL BE INJECTED INTO A THERMAL PROCESSOR (ROTARY DRYER) CONTAINING THE SOIL TO BE TREATED. THE VOLATILE ORGANICS CONTAMINATED SOIL WILL VOLATILIZE INTO THE AIR STREAM AND COMBUST IN AN AFTERBURNER, WHERE THEY WILL BE DESTROYED. THE OFF-GAS FROM THE AFTERBURNER WILL THEN BE TREATED IN A SCRUBBER FOR PARTICULATE AND ACID GAS REMOVAL. IN CERTAIN CASES, THE AFTERBURNER CAN BE REPLACED WITH A CARBON ADSORBER TO REMOVE THE VOLATILES FROM THE AIR STREAM. IN THIS CASE, NO SCRUBBER WOULD BE NEEDED. AFTER TESTING TO ENSURE THAT THE LEVEL OF TOTAL VOLATILE ORGANICS IS BELOW 1 PPM, THE SOIL WILL BE USED AS BACKFILL IN THE EXCAVATED AREA.

THE SECOND STAGE OF THIS ALTERNATIVE INVOLVES EXCAVATING APPROXIMATELY 1,140 CUBIC YARDS OF SOIL, 890 CUBIC YARDS OF WHICH ARE CONTAMINATED WITH SEMI-VOLATILE ORGANICS. MOST SEMI-VOLATILE ORGANICS ARE NOT ADEQUATELY REMOVED BY ENHANCED VOLATILIZATION, THEREFORE, THIS SOIL WILL BE TAKEN OFF-SITE FOR TREATMENT (VIA INCINERATION) AND DISPOSAL. THE AREA OF THIS EXCAVATION WILL BE BACKFILLED WITH CLEAN FILL IN ADDITION TO THE 250 CUBIC YARDS OF SURFACE SOIL WHICH WERE EXCAVATED BUT DID NOT REQUIRE TREATMENT.

ALTERNATIVE S-6: IN SITU VACUUM EXTRACTION/EXCAVATION/OFF-SITE

CONSTRUCTION COST:	\$2,118,000
ANNUAL O&M COSTS:	\$16,500
TIME TO IMPLEMENT:	24 MONTHS

IN SITU VACUUM EXTRACTION INVOLVES INSTALLING WALLS AT A DEPTH OF APPROXIMATELY 20 FEET IN THE AREA OF THOSE "HOT SPOTS" WHICH ARE CONTAMINATED WITH VOLATILE ORGANICS. THE WELLS ARE THEN CONNECTED VIA A PIPE SYSTEM AND ATTACHED TO A VACUUM PUMP. THE VACUUM PULLS AIR THROUGH THE CONTAMINATED SOILS. THIS AIR, CONTAINING THE STRIPPED VOLATILE ORGANICS, IS THEN FED TO A UNIT TO REMOVE THE VOLATILES. EXCAVATION IS NOT REQUIRED FOR THIS STAGE OF THIS ALTERNATIVE.

THE SECOND STAGE OF THIS ALTERNATIVE WILL INVOLVE THE TREATMENT OF 1,120 CUBIC YARDS OF SOIL. THE TREATMENT METHOD IS THE SAME AS FOR THE SECOND STAGE OF ALTERNATIVE S-5 BECAUSE VACUUM EXTRACTION IS NOT AN ADEQUATE TECHNOLOGY FOR THE REMOVAL OF SEMI-VOLATILE ORGANICS FROM SOIL. THE DIFFERENCE IN THE VOLUME OF SOIL TO BE TREATED AS COMPARED TO ALTERNATIVE S-5 RESULTS FROM THE FACT THAT ENHANCED VOLATILIZATION IS CAPABLE OF REMOVING SOME SEMI-VOLATILE ORGANICS PRESENT IN THE SOIL WHICH CANNOT BE REMOVED BY IN SITU VACUUM EXTRACTION.

#### EVALUATION OF ALTERNATIVES

THE PREFERRED ALTERNATIVES FOR REMEDIATION OF THE CONTAMINATED GROUNDWATER AND SOIL AT THE REICH FARM SITE ARE ALTERNATIVE GW-2, PUMPING/AIR STRIPPING/CARBON ADSORPTION/REINJECTION, AND ALTERNATIVE S-5, EXCAVATION/ENHANCED VOLATILIZATION/ON-SITE PLACEMENT/OFF-SITE TREATMENT AND DISPOSAL, RESPECTIVELY. BASED ON CURRENT INFORMATION, THESE ALTERNATIVES PROVIDE THE BEST BALANCE AMONG THE NINE CRITERIA THAT EPA USES AS A MEANS OF EVALUATION.

#### THE PREFERRED ALTERNATIVES

THE PREFERRED ALTERNATIVES, GW-2, PUMPING/AIR STRIPPING/CARBON ADSORPTION/REINJECTION, FOR GROUNDWATER REMEDIATION, AND S-5, EXCAVATION/ENHANCED VOLATILIZATION/ON-SITE PLACEMENT/OFF-SITE TREATMENT AND DISPOSAL, FOR SOIL REMEDIATION, WOULD USE PROVEN TREATMENT TECHNIQUES. ALL VOLATILE AND SEMI-VOLATILE ORGANIC CONTAMINANTS IN THE SOIL WOULD BE TREATED TO ACCEPTABLE LEVELS. THE CONTAMINANTS OF CONCERN IN THE GROUNDWATER WOULD BE REDUCED BELOW THEIR RESPECTIVE ARARS AND THE POSSIBLE MIGRATION OF THESE CONTAMINANTS INTO DRINKING-WATER SUPPLIES WOULD BE ELIMINATED. EQUIPMENT AND LABOR NECESSARY TO CONSTRUCT THESE ALTERNATIVES IS CURRENTLY AVAILABLE.

#### II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

THE REICH FARM SITE INITIALLY BECAME AN ISSUE FOR PUBLIC CONCERN IN 1974 WHEN LOCAL RESIDENTS NOTICED AN UNPLEASANT ODOR AND TASTE IN THEIR DRINKING WATER. SUBSEQUENT SAMPLING BY EPA AND DOVER TOWNSHIP REVEALED THE PRESENCE OF ORGANIC CONTAMINANTS IN THE WATER. IN JULY AND AUGUST 1974, THE DOVER TOWNSHIP BOARD OF HEALTH ORDERED THE CLOSING OF 148 DOMESTIC WELLS WHICH WERE THOUGHT TO HAVE BEEN CONTAMINATED BY WASTES FROM THE REICH FARM SITE. ADDITIONAL COMPLAINTS FROM LOCAL RESIDENTS REGARDING SIMILAR PROBLEMS WITH DOMESTIC WELL-WATER RESULTED IN SAMPLING AND FURTHER DETECTION OF ORGANIC CONTAMINATION AND THE CLOSURE OF AN ADDITIONAL 13 WELLS. ALL RESIDENTS WHOSE WELLS WERE CLOSED WERE SUBSEQUENTLY CONNECTED TO A MUNICIPAL WATER SUPPLY SYSTEM.

MAJOR ISSUES AND CONCERNS EXPRESSED BY THE COMMUNITY REGARDING THE REICH FARM SITE ARE LISTED BELOW:

MIGRATION OF CONTAMINATION THROUGH GROUNDWATER. IN THE PAST, PUBLIC CONCERN HAS FOCUSED ON THE POTENTIAL FOR

CONTAMINATION TO MIGRATE OFF THE SITE ITSELF THROUGH SUBSURFACE GROUNDWATER AND REACH UNCONTAMINATED DOWNGRAIENT WELLS OWNED BY THE TOMS RIVER WATER COMPANY, THE MUNICIPAL SUPPLY IN THE AREA.

ECONOMIC CONCERNS. LOCAL OFFICIALS HAVE, IN THE PAST, EXPRESSED CONCERN OVER THE POTENTIAL FOR THE AREA TO ACQUIRE A NEGATIVE IMAGE DUE TO THE PROBLEM OF CONTAMINATED GROUNDWATER AND SUBSEQUENTLY BECOME LESS DESIRABLE TO PROSPECTIVE RESIDENTS AND BUSINESSES.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS.

COMMENTS RAISED DURING THE PUBLIC COMMENT PERIOD FOR THE REICH FARM SITE ARE SUMMARIZED BELOW. THE PUBLIC COMMENT PERIOD WAS HELD FROM AUGUST 17, 1988 THROUGH SEPTEMBER 19, 1988 TO RECEIVE COMMENTS FROM THE PUBLIC ON EPA'S DRAFT REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (RI/FS) AND PROPOSED REMEDIAL ACTION PLAN (PRAP) FOR THE REICH FARM SUPERFUND SITE. THE PUBLIC COMMENT PERIOD WAS EXTENDED UNTIL SEPTEMBER 22, 1988 FOR TWO POTENTIALLY RESPONSIBLE PARTIES (PRPS), UNION CARBIDE CORPORATION AND THE REICHS. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ARE SUMMARIZED BELOW AND ARE ORGANIZED INTO THE FOLLOWING CATEGORIES:

A. EFFECTIVENESS OF ALTERNATIVES

B. CONTAMINANTS

C. TECHNICAL CONCERNS

D. HEALTH AND SAFETY

E. PRP RESPONSIBILITY

F. TIME FRAME FOR REMEDIATION

G. OTHER CONCERNS

A. EFFECTIVENESS OF ALTERNATIVES

1.COMMENT: A RESIDENT ASKED IF ALL SOIL AND GROUNDWATER REMEDIAL ALTERNATIVES WERE EQUALLY EFFECTIVE, CONSIDERING THE DIFFERENT COST FACTORS.

EPA RESPONSE: WITH THE EXCEPTION OF THE NO ACTION AND CAPPING/GROUT CURTAIN ALTERNATIVES, THE REMEDIAL ALTERNATIVES EPA HAS CONSIDERED FOR THE REICH FARM SITE WILL RESULT IN THE ACHIEVEMENT OF EPA'S OBJECTIVE WHICH IS TO PROTECT PUBLIC HEALTH AND THE ENVIRONMENT IN AS PERMANENT A MANNER AS POSSIBLE. THE DIFFERENCES IN COST RESULT FROM APPROACHING THE PROBLEM FROM DIFFERENT PERSPECTIVES. FOR EXAMPLE, ONCE THE PROBLEM IS CLEARLY DEFINED, EPA EXAMINES SEVERAL DIFFERENT WAYS TO REMEDIATE A PARTICULAR SITE WHILE STILL ACHIEVING THE DESIRED RESULTS. USING DIFFERENT APPROACHES TO SOLVE THE SAME PROBLEM OFTEN CAN, AND DOES, RESULT IN VARYING COSTS.

2. COMMENT: A RESIDENT ASKED IF THE TREATMENT OF TARGET CONTAMINANTS IN THE GROUNDWATER TO A ONE PART PER BILLION (PPB) LEVEL WOULD RESULT IN THE LEVEL OF OTHER CONTAMINANTS IN THE GROUNDWATER BEING REDUCED TO THE SAME LEVEL, AND IF EPA WOULD MONITOR CONTAMINANT LEVELS FOLLOWING TREATMENT.

EPA RESPONSE: BY TREATING THE TARGET CONTAMINANTS IN THE GROUNDWATER TO A 1 PPB LEVEL, OTHER CONTAMINANTS IN THE WATER WILL BE SIMILARLY REDUCED. IT IS EPA'S INTENTION IN THE REICH FARM STUDY TO ADHERE TO DRINKING WATER GUIDELINES ESTABLISHED BY THE STATE OF NEW JERSEY. EPA INTENDS TO CONTINUE TO MONITOR CONTAMINATION LEVELS IN THE GROUNDWATER FOLLOWING TREATMENT. TREATED WATER WILL NOT BE RETURNED TO THE GROUNDWATER UNTIL EPA IS SATISFIED THAT TREATMENT LEVELS ARE SUFFICIENT TO MEET ESTABLISHED DRINKING WATER STANDARDS. EPA WILL DEVELOP A MONITORING PLAN FOR THE REICH FARM SITE AND, ONCE THAT PLAN IS DEVELOPED, THE AGENCY WILL WELCOME ADDITIONAL COMMENTS FROM THE PUBLIC.

B. CONTAMINANTS

1. COMMENT: A RESIDENT ASKED IF EPA IS TESTING THE GROUNDWATER AT THE REICH FARM SITE FOR ALL COMPOUNDS LISTED IN STATE OF NEW JERSEY A-280 LEGISLATION.

EPA RESPONSE: ALTHOUGH STATE OF NEW JERSEY A-280 LEGISLATION; ENTITLED THE INTERIM SAFE DRINKING WATER TESTING SCHEDULE ESTABLISHES A SCHEDULE FOR TESTING PUBLIC WATER SUPPLIES AND LISTS PRIORITY POLLUTANTS, IMPOSES MORE STRINGENT GUIDELINES ON DRINKING WATER QUALITY THAN FEDERAL GUIDELINES, IT ALSO LISTS FEWER PRIORITY POLLUTANTS. EPA IS TESTING GROUNDWATER AT THE REICH FARM SITE FOR MORE CONTAMINANTS THAN ARE LISTED IN THE A-280 LEGISLATION. IN ANY CASE, EPA WILL COMPLY WITH THE MOST STRINGENT GUIDELINES THAT ARE ESTABLISHED.

2. COMMENT: A RESIDENT EXPRESSED CONCERN THAT CONTAMINANTS FROM THE REICH FARM SITE COULD POTENTIALLY AFFECT DOWNGRAIDENT MUNICIPAL DRINKING-WATER WELLS OWNED BY THE TOMS RIVER WATER COMPANY.

EPA RESPONSE: BASED ON EPA'S STUDIES OF GROUNDWATER BETWEEN THE REICH FARM SITE AND THE TOMS RIVER WATER COMPANY WELLS, THERE IS NO INDICATION THAT THOSE WELLS HAVE BEEN AFFECTED BY CONTAMINANTS FROM THE SITE. HOWEVER, EPA PLANS TO INSTALL ADDITIONAL GROUNDWATER MONITORING WELLS TO ENSURE THAT THE OUTERMOST EXTENT OF THE CONTAMINANT PLUME HAS BEEN DEFINED. THESE PROPOSED WELLS ARE PART OF THE DESIGN PHASE OF THE REICH FARM PROJECT AND WILL ALSO AID THE AGENCY IN DETERMINING THE EFFECTIVENESS OF THE IMPLEMENTED REMEDIAL ALTERNATIVE.

3. COMMENT: A LOCAL OFFICIAL EXPRESSED CONCERN THAT EPA HAS NOT FULLY IDENTIFIED THE ORIGINAL SOURCE AND FULL EXTENT OF OFF-SITE CONTAMINATION ATTRIBUTABLE TO THE REICH FARM SITE.

EPA RESPONSE: IT IS EXTREMELY DIFFICULT TO DETERMINE EXACTLY WHAT OCCURRED REGARDING INITIAL OFF-SITE MIGRATION OF CONTAMINANTS THAT MAY HAVE RESULTED WHEN THE BARRELS WERE FIRST PLACED IN THE GROUND AT THE REICH FARM SITE. SINCE THE CONTAMINANTS WERE DUMPED ILLEGALLY, THERE ARE NO RECORD OF THOSE EVENTS, THEREFORE, CIRCUMSTANCES SURROUNDING THOSE ACTIVITIES CANNOT BE TRACED WITH ONE HUNDRED PERCENT ACCURACY. EPA'S STUDIES ATTEMPT TO RECONSTRUCT A COMPREHENSIVE PICTURE OF WHAT OCCURRED, HOWEVER, WE OFTEN ENCOUNTER GAPS IN THE INFORMATION COMPILED. WHEN EPA REACHES THE POINT WHERE THE AGENCY FEELS CONFIDENT THAT OUR STUDIES ACCURATELY AND ADEQUATELY DEPICT THE SITE HISTORY, WE THEN PROCEED WITH STUDIES TO IDENTIFY THE NATURE AND EXTENT OF CONTAMINATION AND DEVELOP AND EVALUATE METHODS TO ADDRESS THE PROBLEM.

#### C. TECHNICAL CONCERNS

1. COMMENT: SEVERAL RESIDENTS EXPRESSED CONCERN REGARDING THE POTENTIAL FOR HAZARDOUS EMISSIONS COMING FROM THE PROPOSED AIR STRIPPER TO BE CONSTRUCTED ON THE REICH FARM SITE.

EPA RESPONSE: EPA MUST ADHERE TO ESTABLISHED STATE AND FEDERAL EMISSION STANDARDS. IN THE CASE OF THE REICH FARM SITE, WE ARE DEALING WITH RELATIVELY LOW LEVELS OF GROUNDWATER CONTAMINATION, THEREFORE, MINIMAL EMISSIONS ARE EXPECTED FROM THIS PARTICULAR AIR STRIPPER. EPA ALSO PLANS TO CONTINUALLY MONITOR EMISSIONS FROM THE AIR STRIPPER TO ENSURE COMPLIANCE WITH ESTABLISHED STANDARDS. IF TESTING INDICATES STATE OR FEDERAL EMISSION STANDARDS WILL BE EXCEEDED, THE AIR STRIPPER WILL HAVE A CARBON FILTRATION SYSTEM INSTALLED NEAR THE TOP OF THE UNIT.

2. COMMENT: A RESIDENT ASKED IF THE AIR STRIPPER WOULD OPERATE AROUND THE CLOCK AND CAUSE UNNECESSARY NOISE IN A RESIDENTIAL AREA.

EPA RESPONSE: ONCE THE AIR STRIPPER IS INSTALLED, EPA PLANS TO OPERATE THE UNIT ON A TWENTY-FOUR HOUR PER DAY, SEVEN DAY PER WEEK SCHEDULE FOR THE DURATION OF REMEDIAL ACTIVITIES. THE AGENCY HAS CONSTRUCTED SIMILAR UNITS IN OTHER RESIDENTIAL AREAS. THE UNIT COULD BE DESIGNED TO OPERATE AT MINIMAL NOISE LEVELS AND SHOULD NOT RESULT IN NOISE-RELATED INCONVENIENCES TO AREA RESIDENTS.

#### D. HEALTH AND SAFETY

1. COMMENT: A RESIDENT EXPRESSED CONCERN OVER POTENTIAL HEALTH EFFECTS THAT MAY BE POSED BY PAST CONTACT WITH CONTAMINATED SOIL AND/OR GROUNDWATER FROM THE REICH FARM SITE AND SUGGESTED THAT EPA LOCATE PEOPLE WHO MAY HAVE BEEN EXPOSED TO SITE-RELATED CONTAMINANTS AND CONDUCT A HEALTH STUDY TO DETERMINE IF ANY NEGATIVE

EFFECTS HAVE, IN FACT, OCCURRED.

ATSDR RESPONSE: ATSDR IS CONCERNED ABOUT PUBLIC HEALTH AND POSSIBLE EXPOSURE TO HAZARDOUS SUBSTANCES. HOWEVER, IT WOULD BE DIFFICULT TO LOCATE ALL THE INDIVIDUALS WHO MAY HAVE BEEN EXPOSED TO CONTAMINANTS FROM THE REICH FARM SITE IN THE PAST. THE AGENCY IS WILLING TO DISCUSS THE FEASIBILITY OF CONDUCTING SUCH A STUDY.

E. RESPONSIBILITY OF POTENTIALLY RESPONSIBLE PARTIES (PRRPS)

1. COMMENT: SEVERAL RESIDENTS AND A LOCAL OFFICIAL ASKED IF A PRP HAD BEEN IDENTIFIED AND IF THAT PRP WOULD ASSUME FINANCIAL RESPONSIBILITY FOR SITE REMEDIATION AND ANY HEALTH-RELATED STUDIES WHICH MAY BE CONDUCTED.

EPA RESPONSE: A PRP HAS BEEN IDENTIFIED BY EPA AND THE AGENCY IS CONDUCTING DISCUSSIONS WITH THEM REGARDING SITE RELATED STUDIES AND COSTS. REGARDLESS OF THE OUTCOME OF THESE NEGOTIATIONS, EPA, THROUGH SUPERFUND, WILL PROCEED WITH CLEANUP OF THE REICH FARM SITE, AND, IF APPROPRIATE, PURSUE THE PRP THROUGH LEGAL CHANNELS.

F. TIME FRAME FOR REMEDIATION

1. COMMENT: SEVERAL RESIDENTS EXPRESSED CONCERN THAT THE TIME FRAME REQUIRED TO REMEDIATE THE REICH FARM SITE WOULD BE EXCESSIVE CONSIDERING THE RELATIVE SMALL SIZE OF THE SITE.

EPA RESPONSE: WITHIN THE NEXT MONTH, EPA, ALONG WITH THE STATE OF NEW JERSEY, WILL MAKE A FINAL DECISION REGARDING THE BEST METHOD TO REMEDIATE THE REICH FARM SITE. FOLLOWING THAT DECISION, A CONTRACTOR WILL BE HIRED TO DESIGN THE PROPOSED REMEDY. AFTER COMPLETION OF PLANS AND SPECIFICATIONS, A CLEAN-UP CONTRACTOR WILL BE CHOSEN THROUGH A COMPETITIVE BIDDING PROCESS. REMEDIAL ACTION AT THE SITE COULD BE UNDERWAY WITHIN ONE YEAR.

OTHER CONCERNS

1. COMMENT: A RESIDENT ASKED IF EPA WOULD SUPPORT LOCAL ZONING LEGISLATION PROHIBITING ANY NEW CONSTRUCTION ON CONTAMINATED SITES.

EPA RESPONSE: EPA WILL SUPPORT PROPOSALS OF THIS NATURE.

IV.  
REMAINING CONCERNS

CONCERNS RAISED BY THE COMMUNITY REGARDING REMEDIAL ACTION AND DESIGN ACTIVITIES AT THE REICH FARM SITE WILL CONTINUE TO BE IMPORTANT COMMUNITY ISSUES THROUGHOUT THE REMEDIAL DESIGN PHASE.

SINCE THERE ARE VERY ACTIVE COMMUNITY ENVIRONMENTAL GROUPS IN THE VICINITY OF THE REICH FARM SITE, THERE IS A MODERATE POTENTIAL FOR THE LEVEL OF INTEREST IN THE SITE TO SHOW SIGNIFICANT INCREASE ONCE REMEDIAL DESIGN ACTIVITIES BEGIN. AREA RESIDENTS SHOULD BE KEPT FULLY INFORMED OF THE STATUS OF REMEDIAL ACTIVITIES THROUGHOUT THIS PHASE IN ORDER TO DISPEL PUBLIC CONCERN.